#4

A Feasibility Study
for the

Wildwood Recreation Site

June, 1975

U.S. Department of the Interior
Bureau of Land Management
Salem District

WILSEY & HAM
PORTLAND, OREGON

A FEASIBILITY STUDY
FOR THE
WILDWOOD RECREATION SITE
JUNE, 1975

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT
OREGON

WILSEY & HAM
PORTLAND, OREGON

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
SALEM DISTRICT

B. T. Vladimiroff	District Manager
Paul M. Sanger	Assistant District Manager
Bill Jensen	Chief, Division of Resources
Karlis Bambe	Area Manager (Clackamas)
Henry O. Blessing	Assistant Area Manager (Clackamas)
Scott S. Abdon	Outdoor Recreation Planner (Study Manager)
William E. Power	Soil Scientist
Larry D. Gano	Recreation Site Supervisor

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Gordon E. Davis	Program Director
Scott E. Fisher	Soil Resources
Paul W. Hughes	P. W. Hughes & Associates Geology and Ground Water Sub-Surface Disposal
Errol F. Garr	Surface Water
Marsha B. Ritzdorf	Recreation Planner

TABLE OF CONTENTS

LIST OF FIGURES

FIGURE NO.

APPENDICES

LIST OF TABLES

APPENDICES

INTRODUCTION

THE WILDWOOD RECREATION SITE

The Bureau of Land Management's (BLM) Wildwood Recreation Site (hereinafter referred to as the Recreation Site), is located on the Mt. Hood Loop Highway (U. S. Highway 26) approximately 40 miles east of Portland and 2 miles west of Zig Zag.

The 362-acre Recreation Site, originally known as the Salmon River Recreation Site, was withdrawn from the commercial forest land base and classified for public recreation in November of 1961. Plans developed subsequent to that time have shown relatively extensive recreation development over most of the Recreation Site.

The first phase of development, completed in 1968, is classified as a Family Picnic Area and includes 68 picnic units, numerous paved trails, parking areas, rest rooms and other necessary support facilities. The Phase II development, completed in 1971, is generally classified as a Group Activity Area. Its facilities include covered group picnic units and kitchens, rest rooms, play fields and courts, paved trails and parking areas and other support facilities.

Originally, the Phase III development was slated for construction in February, 1973 and was planned to contain additional group picnic areas, a children's play area, a mobile home parking area, additional trails, overnight camping facilities, a trailhead area, and other facilities.

As successful as the first two phases were, however, they were not without apparent problems. Concern arose over the adequacy and acceptability of the existing sub-surface sewage disposal systems in both the Phase I and II areas. Considerable ponding of water in portions of the Recreation Site along with spot checks by BLM officials of soils and water conditions led to the belief that the existing disposal systems may not be functioning properly and may additionally have design deficiencies. For these reasons, prior to undertaking any Phase III development, it was felt that a thorough analysis should be undertaken to determine existing problems and to test the feasibility of any possible expansion of facilities.

STUDY OBJECTIVES

The overall study objectives principally are to test the feasibility of expanding recreation facilities against the capabilities of the Recreation Site to handle additional use and dispose of additional sub-surface sewage. Also, the study is to describe problems with the existing facilities and to identify present and future demands for recreation opportunities in the vicinity of the Recreation Site.

To accomplish these objectives, three discipline areas are utilized with the following parameters of involvement:

- Soils: Capabilities and limitations of the soil to (1) accept and effectively dispose sewage, and (2) support recreation facility development,

- Hydrology: Conditions of the water table and drainage patterns as they relate specifically to the soil,

- Recreation Planning: Recreation demand and the need to provide additional outdoor recreation opportunities in the general vicinity.

REPORT FORMAT

This report is organized as a main text containing general descriptions of existing conditions and analyses of findings supported with a technical appendix containing necessary back-up data. While the three discipline areas have guided the scope of investigations, the main text portion of this report is organized into more generalized categories. The section entitled Sub-surface Conditions includes discussions of geology, ground water, water quality, evapo-transpiration losses and the existing sewage disposal system. The section entitled Surface Condi-

tions includes discussions of soils and surface water conditions. The section entitled Recreation Demand Analysis includes a discussion of recreation demand. The final section of the main text entitled Summary of Conclusions and Feasibility, is perhaps the most important of the report since it represents a synthesis of conclusions reached in individual sections as well as interdisciplinary conclusions reached by team members relative to the objectives of the study.

Several referencing systems are used throughout the report. A standard footnote and literature reference format are used as well as a special appendix referencing system. This latter system uses a parenthetic insert in the text that contains both a letter and numerical notation. The letter refers to the lettered appendix and the numeral refers to an appendix item. As an example, (B.5) refers to Appendix B and the fifth numbered item in that appendix. In some cases appendix tables and figures are referenced directly from the text.

SUB-SURFACE CONDITIONS

GEOLOGY

The Recreation Site is situated on the west slope of the Cascade Range of Oregon at the boundary of two physiographic provinces:

1. The Western Cascades, which comprise the highly dissected western slope of the range, is composed primarily of deformed flow and pyroclastic rocks of Eocene and Miocene age, and

2. The High Cascades, which cover the little dissected crest of the range, is composed of Pliocene and Quaternary volcanics which are little deformed.

The Recreation Site is adjacent to Salmon River in a wide U-shaped glacial valley which also includes Sandy River. Both rivers are far too small to have eroded the present valley by fluvial processes. A hanging valley, formed by glacial ice is located southwest of Salmon River within the Recreation Site. Locally, glacial till or morainal debris is not evident, and possibly may have been re-worked into terrace deposits by melt water of the receding glacier or by Salmon River.

The rock units described in this section were mapped in the field and compared with known or type descriptions available in the geologic literature. In areas where the bedrock outcrop passes beneath a soil cover, the continuation of the bedrock was inferred to be present based upon the continuity of the landform expressed by the outcrop. Aerial photographs were used extensively in the mapping effort. Formation of map unit nomenclature was standardized with current geologic investigations of the U. S. Forest Service (USFS). There is close agreement of the geologic map in this report with one prepared by USFS geologists (1).

Rock Units

Five basic geologic rock units exist on or in the vicinity of the Recreation Site. Figure 1, along with the following discussion, describes the characteristics of these units.

Yakima Basalts (Upper Miocene)

Although the Yakima formation does not crop out in the Recreation Site, it is important regionally as an aquifer and a source of artesian water (discussed under Ground Water). An exposure of Yakima Basalt does occur, however, along Salmon River approximately two miles downstream from the Recreation Site (2)(A.1).

Rhododendron Formation (Upper Miocene)

The Rhododendron formation overlies the Yakima Basalts often in angular unconformity. At the Recreation Site only the bottom of the Rhododendron formation is exposed and because much of it is highly indurated, it can maintain steep slopes such as occur in the exposure on the southwest side of Salmon River.

Terrace Deposits - (Quaternary)

Sands and silts, with a well developed soil profile, overlie the Rhododendron formation on terraces formed either by glacial melt water or the downward and lateral cutting of Salmon River. The thickness of the terrace deposits is not known with certainty, but it is estimated to be less than ten feet in most areas. Iron oxide cementation has taken place at varying depths within the terrace deposits.

Numerous large boulders of igneous rocks occur within or on the terrace deposits. The boulders may represent a glacial original or a residual remnant of the underlying Rhododendron formation.

River Alluvium - (Quaternary)

Alluvial deposits adjacent to Salmon River are composed of cobbles, gravel and sand. The deposits are uncemented and have very little material of fine sand or silt size. The source of the alluvium is the

Rhododendron formation and overlying terrace deposits. The river alluvium is limited to a discontinuous narrow band adjacent to either bank of Salmon River.

Marshland (Recent)

Marshlands cover more than 50 percent of the Recreation Site. Marshlands such as these occupy much of the entire Salmon River floodplain and other depressional areas between valley terraces. Generally, surface drainage in these areas has been disrupted, most likely by valley glaciation. Local runoff is often impeded by low slope gradients and thick accumulation of organic debris. Soils beneath the organic mat consist of sands and loamy sands. Water is ponded by a fragipan of iron oxides at a depth of 4 to 14 inches below the surface.

Geologic Hazards

Geology, while providing the structural base for many physical systems, is oftentimes a fragile element subject to disruption by those same systems. Geologic hazards are not only potentially dangerous to man, but if disregarded can create costly damage as well. The Recreation Site contains several geologic or geology related hazards. Figure 2, along with the following discussion, elaborates on these conditions.

Landslides

Landslides or slumpage would be most likely to occur in the steep slopes of the Rhododendron formation located in the southwest portion of the Recreation Site. Such a condition could occur as a result of water infiltration into zones of material with low cohesive strength such as the thin tuff interbeds. The Rhododendron formation has horizons of moderate to high permeability evidenced by the numerous springs which crop out just above the contact with marshlands after a period of high precipitation. Water saturation coupled with the structural dip of the tuff interbeds could result in landsliding.

Landslides have occurred on the Recreation Site in the past, particularly in the fan areas on the south side of Salmon River. The valley walls are steep in several areas and will be subject to landslide potential in the near geologic future. The

more apparent hazard of immediate concern is from rock falls.

Rock Falls

Rock falls, as with landslides are most likely to occur in the Rhododendron formation in the southwest part of the Recreation Site, particularly in areas of steep slopes. The conglomeratic nature of the Rhododendron formation lends itself to rock falls and an accumulation of debris can be found along the base of cliff areas at points A, B and C (figure 2). Less resistant units, such as tuff interbeds, erode more rapidly than overlying more resistant units lending to a high probability of undercutting by both climatic conditions and stream erosion (discussed below). Erosion from climatic conditions occurs principally from the continuous freezing and thawing of moisture in the exposed surface of the Rhododendron formation. The resultant expansion and contraction of this process loosens cobbles, builders and large breccia blocks. Their erosion often results in the development of highly unstable overhangs.

High Water Table and Ponding

Evidence of high water table and ponding is most noticeable in the marshland areas of the Recreation Site. Disrupted drainage resulting from glaciation and logging, give many areas an interior drainage system where ponding is likely to occur. This condition, combined with the presence of impermeable layers within the Rhododendron formation and an iron oxide fragipan in the soil horizon beneath the marshlands, creates an ideal situation for permanent ponding of water on or at the surface during the wet season.

Stream Erosion

Stream bank erosion can result in the loss of land as well as increasing the incidence of landsliding and rock fall. In the southwest portion of the Recreation Site (Point A, figure 2) where Salmon River abuts the steep slope of Rhododendron formation, undercutting has and will probably continue to occur and could result in landslides and rock falls.

Rapid stream erosion as well as normal climatic erosion of the Rhododendron formation is taking place


Mr
Qm
Qal
Mr
SALMON RIVER
4
5
6
7
B. L. M.
1285.70'
N 89° 52' W
N 00° 42' E
1323.26'
PRIVATE PROPERTY
Qal
Qt
Qt
Qt
Phase I
Qm
Qm
Qm
Qt
3
Qm
2
Phase II
1
5
Qt
Geologic Age
Recent
Quaternary
Upper Miocene
Qm MARSH OR WETLANDS
Qal RIVER ALLUVIUM
Qt TERRACE DEPOSITS
Mr PYROCLASTICS
1 - 8 WATER QUALITY TEST LOCATIONS
UNITED STATES DEPARTMENT OF THE INTERIOR
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0
200
Feet
Figure 1
GEOLOGY
Wildwood Recreation Site
Wilsey & Ham
June, 1975


A
B
C
SALMON RIVER
B. L. M.
1285.20'
N. 89° 58' W
N 00° 42' E
1323.26'
PRIVATE PROPERTY
Phase I
Phase II
ROCKFALLS AND LANDSLIDES
STREAM EROSION AND ROCKFALLS AND LANDSLIDES
PONDING AND HIGH WATER TABLE
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
0
200
Feet
Figure 2
GEOLOGIC HAZARDS
Wildwood Recreation Site
Wilsey & Ham
June, 1975

along the high bank of Salmon River in the south central area of the Recreation Site. The cliff section of conglomeratic beds is being rapidly undercut at this site (Point C, figure 2). This condition is expected to continue until sufficient rock fall debris accumulates at the base of the cliff to alter the river edge and decrease the gradient of the cliff slope.

GROUND WATER

Ground water at the Recreation Site and in the general Wildwood vicinity occurs under both water table and artesian conditions.

The primary source of ground water to the Recreation Site occurs in the lower and upper aquifer portions of the Rhododendron formation. (A.3) At the existing wells on the Recreation Site the top of the lower aquifer is at a depth of approximately 87 feet and the top of the upper aquifer is at a depth of approximately 28 feet. Both aquifers are at a depth where no danger exists for their contamination from downward movement of effluent from existing septic drainfields, particularly since both are up-gradient from those drainfields.

The water table in the terrace deposits on the Recreation Site generally occurs at a depth greater than five feet. In one area, however, a narrow band of a high water table exists along the southern edge of the terrace deposits in the Group Activity Area (figure 1). At this point the terrace deposits have low permeability and the normal southward flow of ground water is impeded and the water table rises to the surface.

Within the river alluvium areas, the ground water table is from two to five feet below the land surface. Permeability of the alluvium is high and water moves rapidly through the gravels.

The soils beneath the marshland areas are similar to those of the terrace deposits. A thick organic layer,

the topographic lows and an iron oxid fragipan account for the location of the marshlands. The water table is generally at the surface through the wet season and slightly below (within two feet) the surface during the remainder of the year.

WATER QUALITY

Regionally, the quality of ground water is generally good and within acceptable limits of the U. S. Environmental Protection Agency (EPA). At the Recreation Site, as in the general Wildwood vicinity. however, a water quality problem does exist insofar as a high iron and manganese content. Well logs of the shallow well on the Recreation Site show iron and manganese contents to be from 30 to 60 times the suggested standard for drinking water. While this is not a direct health hazard, it does have considerable effect on the aesthetic conditions of water for drinking and cooking. Additionally, the high iron content will allow a relatively rapid build-up of deposits in the water system, ultimately reducing its effectiveness. Neither condition is considered a major problem, particularly for a recreation facility.

On March 25, 1975, a series of samples were collected to determine if there was any evidence of pollution from septic tanks or other sources of domestic sewage. The results of a bacteriological and chemical analysis are shown on Table A-2, Appendix A. There was no evidence of fecal coliform in any of the samples, but very high readings were obtained for total coliform at testing locations Nos. 1 and 2 (figure 1). A high total coliform reading is indicative of both organic soils and animal wastes. Examination for Nitrate-Nitrite and Chlorides did not yield any detectable quantities of these two constituents of sewage effluent. The tests are inconclusive, however, regarding the effects of existing sub-surface sewage disposal since they were conducted during a period in

which no effluent was being discharge. (For additional discussion, see sections on existing sewage disposal system and conclusions and feasibility.)

DETERMINATION OF EVAPO-TRANSPIRATION LOSSES

An important part of the natural water cycle is the loss to the ground water, surface water and vegetation systems of moisture through evaporation and transpiration. The loss by evapo-transpiration is composed of three parts:

1. Direct evaporation of precipitation intercepted by tree leaves and branches before it reaches the ground,

2. Evaporation of moisture from the soil (usually applicable to only the first foot depth, and

3. Transpiration of moisture drawn from the soil by roots of forest vegetation (usually applicable to a three or four-foot depth).

Conifers account for most of the intercepted precipitation because they keep their needles throughout the year, while hardwoods have no leaves in the wet season and therefore are only marginally involved in the evaporation process.

Other factors in evapo-transpiration also include climate (temperature, seasonal precipitation, wind, sunshine), topography, soil type and depth, and availability of soil moisture.

Average annual precipitation, occurring mostly in the October-May season is estimated at approximately 80 inches at the Recreation Site. Some occurs as snowfall, but there is very little, if any, snow storage carryover into the spring season. The soil condition at the beginning of spring is wet, with a gradual soil drying and lowering of the water table until the beginning of autumn. Occasional late spring and light summer rains

may interrupt or temporarily reverse the process, but the drying trend generally continues until autumn. Thus, during periods of heavy public use, the soil is drying, the water table is receding a foot or more, and drainage is improving.

Forest cover of the Recreation Site was mapped in three classes: hardwood (black cottonwood, red alder, and bigleaf maple, the principal species), conifer (grand fir, Douglas fir, western hemlock, and western red cedar, the principal species), and mixed conifer-hardwood. (See figure 3.) Hardwood occupies 21 percent; conifer, 39 percent, and mixed conifer-hardwood, 40 percent of the area.

Of the three components of evapo-transpiration, soil evaporation is of little consequence where there is a dense forest canopy, an understory, and an accumulation of litter on the soil surface which acts as a protective mulch against evaporation. Such a condition exists over much of the Recreation Site. The principal evaporation loss is from snow and rain intercepted and held by leaves, twigs, and branches of tree crowns. This varies from an eighth to a quarter of an inch depth of water per storm, averaging perhaps a fifth of an inch (5, 6, 7).

During the warm, dry summer season, transpiration losses from all three classes of forest are greatest, and at their peak in July and August. Since this is the period of lowest precipitation and least replenishment of soil moisture, the soil moisture deficiency, that is, the difference between precipitation amount (minus interception losses) and transpiration draft, may reach three and a half inches for the month of July on the Recreation Site (A.4). However, there is always some lateral soil moisture replenishment in the alluvium from Salmon River, and for the southern undeveloped portion of the Recreation Site, by subsurface drainage from the steep surrounding hills.

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Figure 3

FOREST DISTRIBUTION

Wildwood Recreation Site

Wilsey & Ham — June, 1975

THE EXISTING SEWAGE DISPOSAL SYSTEM

There are five sub-surface drainfields at the Recreation Site for disposal of sewage. Three of the drainfields are located in the Family Picnic Area adjacent to Salmon River. According to current standards for sub-surface sewage disposal (9), these drainfields are in violation of at least two rules:

1. The drainfields are not a minimum of 100 feet up-gradient from a surface stream or drainage water, and

2. The water table is not at least six feet below ground surface.

At the Group Activity Area, the other two drainfields are in violation of at least three

1. The depth of the drainfield trenches exceeds the maximum allowable of 36 inches,

2. The drainfields are below the water table during a part of the year and, therefore, cannot function properly, and

3. The first restrictive layer in the soil is less than the 30-inch minimum. (Restrictive layer is between 14 and 20 inches.)

In the Family Picnic Area, the system malfunctions primarily because of rapid percolation of effluent through the river alluvium to the water table without treatment. There are no available methods for repairing or re-designing the drainfield systems at their present location.

In the Group Activity Area, the effluent is not properly treated when the water table is above the drain tile and the effluent flows upward to the surface due to the lower permeability of the soil. The untreated effluent is a health hazard. There are no available methods for repairing or re-designing the drainfield systems at their present location due to low permeability and a restrictive layer at depths less than 20 inches.

SURFACE CONDITIONS

SOIL RESOURCES

Soils are obviously important in supporting the biotic communities which are present on the Recreation Site. The unique character of many of these communities is directly related to soil and associated hydrological conditions. The characteristics of soils control much of the suitability of land for human use. The important characteristics that frequently determine suitabilities of the soil range from texture, organic matter content, restricting horizons to the many other parameters which control water movement through the soil.

With the soil system intimately linked to surface and ground waters, the quantity and quality of these waters are, to a sizeable extent, controlled by the nature of the soil system. Some areas of the Recreation Site have conditions different from a total natural system in that they serve as the depositional site for sanitary wastes generated by recreation visitors. Thus, the character of the natural percolating waters has been altered to some extent.

Scope of Analysis and Methodology

A high intensity soil survey was carried out on the Recreation Site. Figure 4 shows the mapping units established for the site from this survey. Detailed descriptions of the characteristics and limitations of the soils, along with analytical laboratory support information, can be found in Appendix B. The field portion of this study was conducted in March, 1975 under inclement weather conditions. While the analysis and conclusions reached in this study are believed to be accurate, some desirable information was not possible to obtain or does not have a high degree of reliability. This is particularly true with regard to soil structure and bulk density.

General Description of Soil Resources

The soils in the area are developing in sediments of fluvial origin. The parent materials are generally

sandy--i.e. ranging from coarse, fine sandy loams to sand textures, and have been water washed, sorted and deposited. The Rhododendron formation has some amounts of iron and silicious cementation which also appear in wide ranges in the more recent alluvial sediments.

The widespread presence of a fragipan in most of the soils in the study area is of particular concern in determining their suitability for sub-surface sewage disposal. The fragipan is formed from iron and silicious cementation of the relatively sandy substratum. There are wide ranges in levels of cementation or development of the fragipans evident in the soils. Soil series B (Table B-2, Appendix B) have an incipient fragipan and at times become so weakly developed that it is very difficult to recognize, particularly during the field season in which this analysis was undertaken. The depth to the fragipan in the soil solum is much greater in this series than in series A (Table B-2, Appendix B) where it is generally encountered at depths of 12 to 15 inches. The degree of cementation is of particular importance in that this directly influences the permeability of the horizon. This characteristic influences the percolation of surface water with the resultant extreme ponding or perching of water tables that is widespread throughout the study area.

Many of the soils, particularly those with fragipans close to the surface, have extensive and well developed organic surface horizons. There is a positive correlation between the depth of a well defined fragipan and the development of the thick organic epipedons. The fragipan, which develops as a result of soil forming processes, prevents the percolation of the water through the soil. This generally results in an increase in the amount of organic material produced and a definite increase in the rate of attrition of organic matter into the soil system. The latter is accomplished by reducing the rate of oxidation or alteration of the organic materials through depression of microbial respiratory rates and basic species compositional changes.

Some of the mapping units established during this study have significant amounts of rounded gravels in their solum. This is particularly true of the soils on the lowest bench on which the water pump station is located. The fragipans which develop in these gravelly

See Text For Soils Descriptions and Interpretations

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0 200
Feet

Figure 4
SOILS

Wildwood Recreation Site
Wilsey & Ham June, 1975

and sand textures seem to be particularly indurated and impervious. The gravel materials are not widespread throughout the study area, but are nonetheless important in determining suitabilities of the mapping units.

Soil series E (Table B-2, Appendix B), which is primarily found south of Salmon River, is of limited extent, but vastly different from any of the surrounding soils. This series is basically an organic pedon which has been formed insitu from organic material deposition. It is the direct result of hydric succession and is dominated by organic matter resultant from plant growth. The degree of decomposition ranges widely, with some of the material being readily recognizable, and other portions appearing as a muck in which only the most resistant materials remain in their original form.

SURFACE WATER

Surface water conditions on the Recreation Site occur as local surface drainage from precipitation both on and off of the site, and as river flow in Salmon River itself. Both represent important parameters in the use of the Recreation Site and the surface drainage system is directly effected by natural conditions of the land and the uses applied to the land.

Flood Plain Analysis

Salmon River flows westward from the Cascade Range with headwaters originating on Mt. Hood. Its watershed upstream from the Recreation Site is approximately 100 square miles. From the Recreation Site to the headwaters is approximately 33 miles.

River flows are dependent on snow pack melt and direct precipitation runoff. Peak flows can be expected to occur from October to May with generally three peak periods. Early peaks in late fall and in early winter are generally a direct result of heavy rainfall. A mid-winter peak oftentimes occurs as a result of rainfall

on low elevation snow accumulation. A spring peak usually occurs as a result of spring snow melt and will occur, depending on the amount of snow pack and spring temperatures, anytime from March through May.

Existing flood plain information for the general Salmon River vicinity has been prepared by the U. S. Geological Survey (USGS) and represents only a Flood-Prone Areas designation. No river cross-sections were found for selected points along the river so that flow/volume/bank elevation characteristics could be established. In the absence of this information, a rough profile was established between recorded gage readings for two of the three inactive USGS gaging stations, one upstream and one downstream from the Recreation Site, for a maximum recorded event (B.2). From this, approximate elevations were established across the Recreation Site for an event that is the approximate equivalent of a 50 year peak flood. (See figure 5.)

Site Drainage Areas

An identification of all perennial and intermittent drainage ways for the Recreation Site was made to better understand its drainage characteristics, origin of surface water flows, existing collection of these flows, existing problems and limitations that these characteristics represent for potential expansion.

Six separate drainage areas occur on the total site (see figure 5), five of these occurring between Salmon River and U. S. Highway 26. The area south of Salmon River is considered in this analysis as one drainage area and constitutes the sixth designated area.

Drainage Area I - The most northerly area has surface water flow to the north toward U. S. Highway 26.

Drainage Area II - This area collects the overland flow from the existing Group Activity Area. Approximately 10 acres of offsite land area contribute to the overall drainage of this

area. The drainage way for this area is in an east-west direction with a definite swale for open-channel flow of surface water.

Drainage Area III - This is the largest of the drainage areas. Its drainage way is also in an east-west direction and collects surface flow from approximately 120 acres of off-site land located to the east.

Drainage Area IV - This area begins at the existing access road and has a drainage flow in a northeasterly direction.

Drainage Area V
Drainage Area VI - These two drainage areas are considered direct Salmon River drainage in that their flow is directly to the river. These areas are essentially river bank areas.

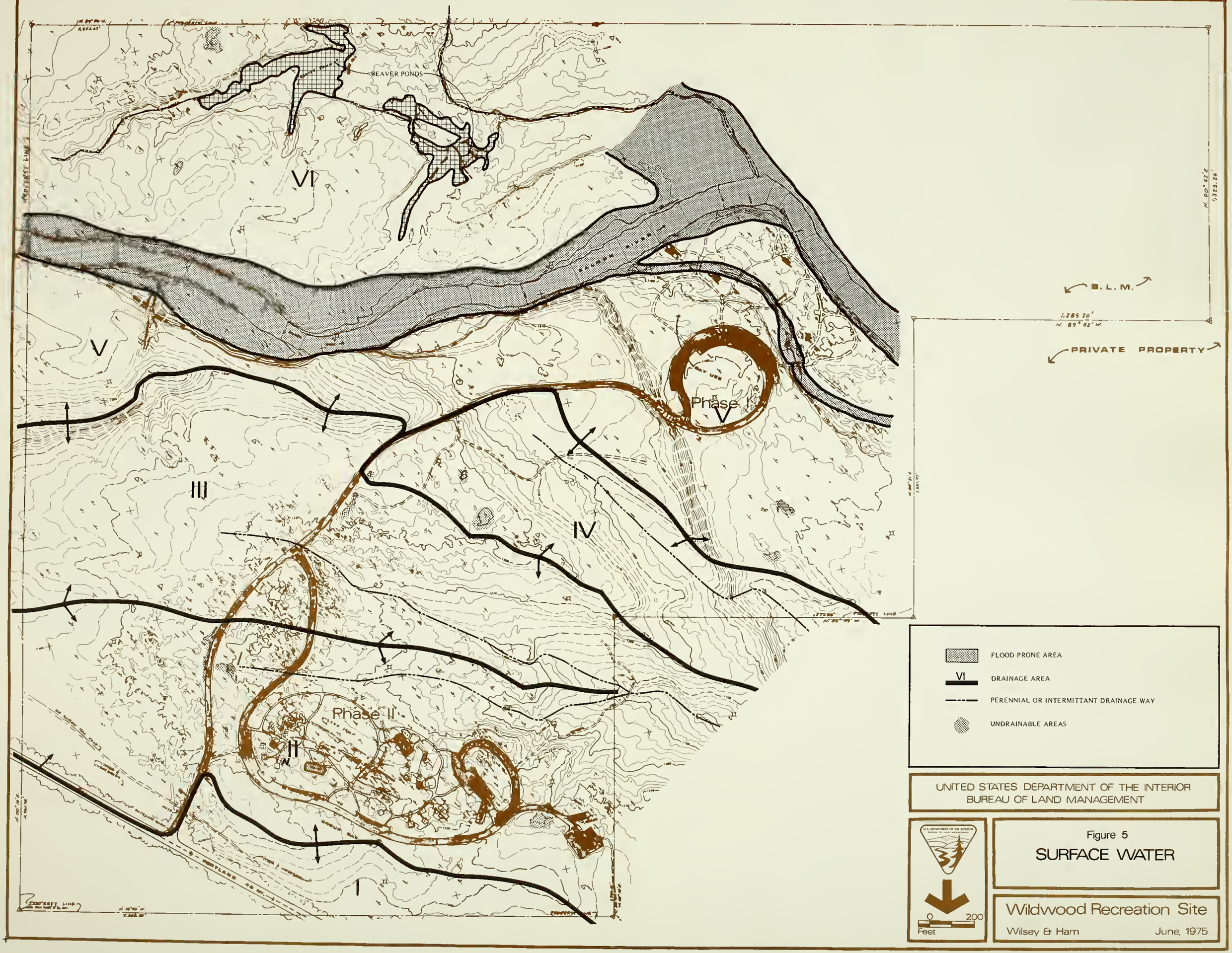
Existing Use and Related Problems

For the most part, all of the drainage ways are open channels consisting of natural swales or roadside ditches. Where drainage ways are not shown, the overland flow occurs as either sheet flow during heavy storms or there is no flow at all if the permeability is rapid and vegetation dense. It was observed during field inspection that improvements to the channel in Drainage Area II have been made (see figure 5). This drainage area is blocked, however, by the two existing roadways and may be lending to the very wet conditions of the surface in adjacent areas.

From a review of topographic maps and site inspection, several areas of the site are considered marshlands with some localized areas possibly undrainable (see figure 5). These areas are lower in elevation than all of their surrounding lands and have no means of surface water drainage other than through percolation and evapo-transpiration.

A major problem to surface water flow is off-site conditions east of the Recreation Site. Drainage Areas II and III are most affected by conditions in this area as will be the far eastern portion of Drainage Area V. Recent parceling of land immediately adjacent to the east boundary of the Recreation Site raises the possibility of development in this area. While large parcels of the subdivision would not generally bring development that could increase the quantity of surface water flow, improperly designed and installed sewage disposal systems could increase the possibility of deteriorating the quality of the surface water flow.

Drainage Area VI represents a unique surface water area. It is an area of high water table during much of the year and has, overtime, experienced considerable decomposition of organic material. In recent years, Beaver have developed a series of dams that have ponded water in several areas, changing drainage patterns and further modifying vegetative conditions. The total drainage area from which water enters the vicinity of the Beaver Ponds ranges considerably beyond the Recreation Site resulting in generally larger surface water flow than exist in any of the other drainage areas on the Recreation Site.


BEAVER PONDS
VI
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Phase II
B. L. M.
PRIVATE PROPERTY
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1,323.24'
FLOOD PRONE AREA
DRAINAGE AREA
PERENNIAL OR INTERMITTANT DRAINAGE WAY
UNDRAINABLE AREAS
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
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Figure 5
SURFACE WATER
Wildwood Recreation Site
Wilsey & Ham
June, 1975

RECREATION DEMAND ANALYSIS

INTRODUCTION

Since the early 1920's recreationists have been drawn to Mt. Hood and its adjacent forested areas to participate in a wide variety of summer and winter recreational activities. Although the majority of the recreational opportunities have been provided by public agencies, private organizations also operate a variety of facilities. Working without benefit of an overall recreational or land use plan, these public and private organizations have attempted to provide recreational facilities that meet the public's recreational demands.

Historically the USFS, as the largest manager of public lands in the Mt. Hood area, has had primary responsibility for land use and recreational planning. Following recent land use planning trends, however the USFS is extending this responsibility to larger multi-agency groups and large scale citizen participation programs. Therefore, the Mt. Hood Community, under the leadership of the USFS is undertaking a planning program designed to reorient land use policy towards a more regionalized approach (C.1). The Mt. Hood Inter-Agency Planning Team, more commonly called "Hood Input", is composed of governmental representatives from Clackamas and Hood River Counties, Columbia Regional Association of Governments (CRAG), USFS and BLM. Its goal is to produce a cooperative land use and development plan for the entire Mt. Hood Planning Unit (see figure 6).

In March, 1975 the Hood Input published a study which proposed four alternative futures (figure 7) for the Planning Unit and asks for citizen comment and review. Briefly stated the proposed futures are as follows:

Future I — Describes a future of little or no change from present policy. Existing agencies would continue to make individual decisions on zoning and other land use policy in the area.

Future II — Describes a cooperative interagency approach with some changes to all aspects of community growth within

Figure 6

RECREATION PLANNING DISTRICTS

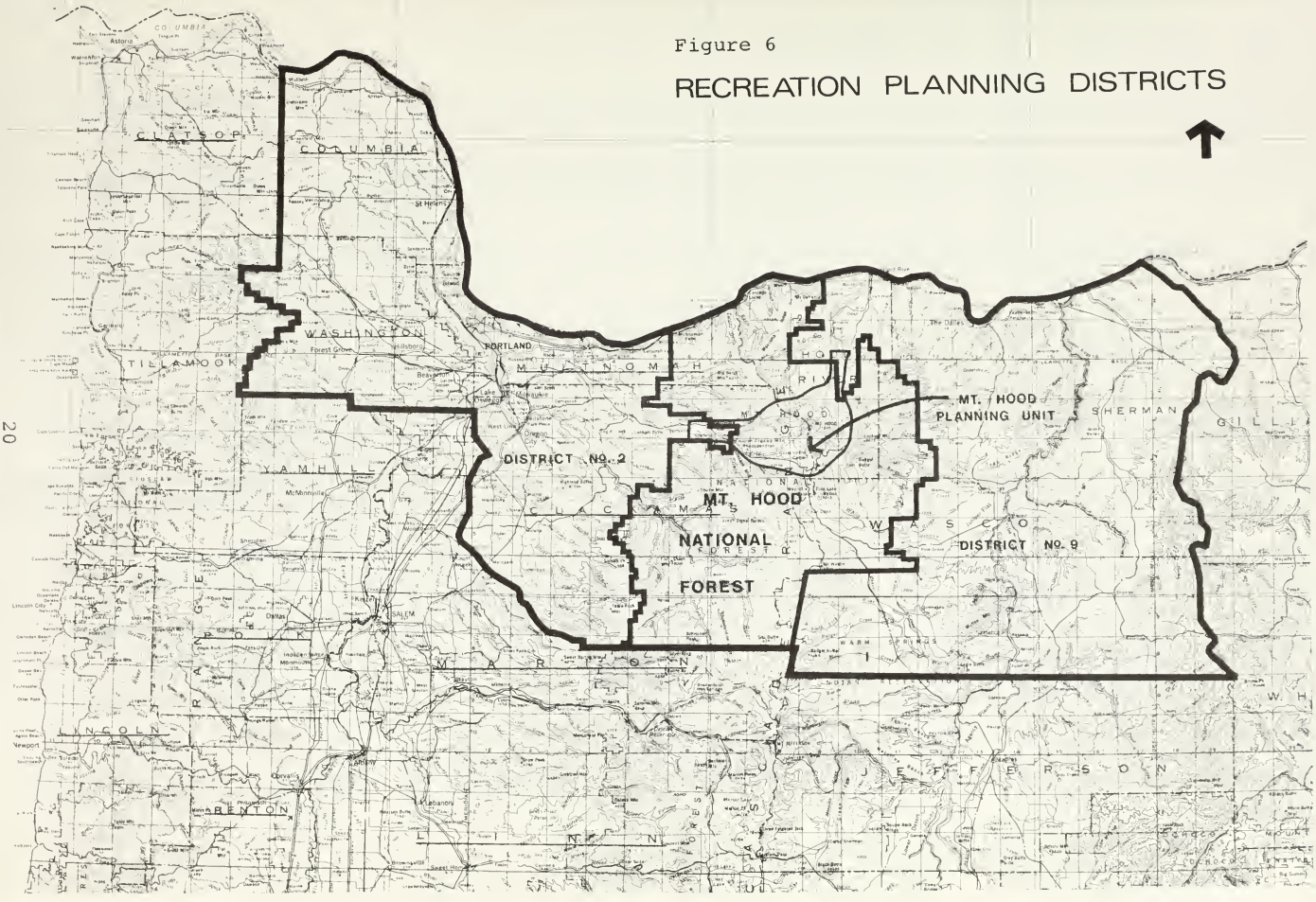


Figure 7

FUTURES / ELEMENTS	Future 1	Future 2	Future 3	Future 4
AGRICULTURE & FOREST	Continued shift to other uses; timber management level varies.	Maintain present agriculture lands; timber management level is high, but less land available.	Expand agriculture to all suitable lands; high level timber management.	Maintain orchard lands; timber management is lower priority.
HOUSING	Controlled by permitted services; upper level of development undefined.	Mixed pattern; some clustered growth.	Maintain rural character; minimal development expansion.	Expand community clusters, but maintain separation.
COMMERCIAL & INDUSTRIAL	Increase in numbers and size; some additional strip development.	Expand within present centers; no additional strip development.	Limited expansion of present centers; revert some existing strip development to forest.	Some new, concentrated centers at specified sites
RECREATION & WILDERNESS	Expand ski, golf facilities project by project; some adjustment of present Mt. Hood wilderness boundary.	Limit ski to present permit areas, some new overnight accommodations, additional new wilderness.	No expansion of ski or golf; some additional new wilderness.	Expand golf, ski, summer use areas, and resort accommodations; all potential wilderness.
WILDLIFE & FISHERIES	Uncontrolled dog harassment, gradual decline in native habitat; greater dependence on trout stocking.	Moderate harassment level, some native habitat loss, some expanded fisheries.	General habitat maintenance, with altered species mix; expanded fisheries.	High harassment levels; establish game refuge; maintain trout stocking.
MINERALS ENERGY & POWER	Geothermal siting and rock quarries case by case; permit new power corridors as needed.	Maintain present quarries and power corridors; present type geothermal incompatible.	Permit geothermal sites, existing rock quarries and power corridors. All highly regulated.	Additional rock quarries and local power corridors, but highly regulated; present type geothermal incompatible.
TRANSPORTATION	Expand Highway 26 to full four lanes. Increased parking at developed recreation sites.	Highway 26 with some three- and four-lane parkway segments and controlled access; emphasize mass transit during peak use.	Highway 26 is improved two-lane expressway - emphasize all-season mass transit.	Four lanes on Highway 26; mass transit (Laurel Hill to ski areas) and some increased parking.
SEWER WATER & SOLID WASTE	Upgrading of existing systems required; new systems or expansion of present systems case by case.	Improve existing sewer and water service, some expansion within firm boundaries.	Predominantly septic tanks on suitable land; improve existing sewer and water systems, but no expansion.	Urban-level sewerage and water system required, but contained service areas; new solid waste transfer station.
FIRE POLICE & SCHOOLS	Expand local police, fire and school facilities as needed; fight all forest fires aggressively.	Additional local fire protection facilities in high use areas; allow some forest fires to play natural role; new school facilities on westside; increased county and state police protection.	Upgrade local fire protection services and expand forest fire fighting capabilities considerably; maintain present level of police protection; some additional school capacity on westside.	New fire stations and schools required; significantly expand police protection; fight all forest fires aggressively.
TAXATION & PUBLIC COSTS	Unpredictable increase in local taxes and public expenditures over long term; gradual reduction in timber revenues.	Some increases in public expenditures and higher taxes; moderate increase in timber revenues.	Lowest public expenditure level and local tax increase. Increasing timber receipts and revenues.	Highest public tax receipts, but greatest public expenditure level; loss of timber revenues.
ADMINISTRATION	No change in jurisdictional authority, disband interagency planning.	Some new local service authority on private lands; continue interagency coordination; explore bi-county monitoring commission.	Continue present jurisdictional authorities, and interagency coordination; explore bi-county monitoring commission.	Some local incorporation, continue interagency coordination. Explore bi-county monitoring commission.

the Planning Unit. Communities would be concentrated, agricultural lands would be maintained and forest management would occur at a high level.

Future III — Emphasizes maximum resource production with substantial increases in agriculture, forest products and related commodities.

Future IV — Emphasizes maximum recreational development including overnight resorts, planned unit developments and other forms of on-site recreation.

Since each future alternative indicates different allocations of land use, the supply/demand analysis for recreation will be affected by the alternative that is chosen. The Recreation Site's location within the Planning Unit makes it directly affected by any changes in land use patterns. Within the following recreation demand analysis, the four planning futures will be analyzed regarding future recreational supply, while the Oregon Outdoor Recreation Study prepared by the Oregon State Highway Division will be used as the basis for recreation demand projections (3) (C.2).

EXISTING INVENTORY OF RECREATION FACILITIES AND USES

Recreation facilities within the Planning Unit are shown in figure 8 and include facilities in the Mt. Hood National Forest, state and county parks and BLM and other federal, state and county lands open to recreation. Facilities also include all streams and rivers open for fishing, boat landings, and all private recreation facilities. Proposed facilities are defined as those facilities which are already budgeted or are given a high degree of completion probability by the year 1990 by the agency through which they are proposed.

PACIFIC CREST NATIONAL SCENIC TRAIL #2000

POLALLIE CAMPGROUND

CLOUD CAP SADDLE PICNIC GROUND

TILLY JANE CAMPGROUND

SHERWOOD CAMPGROUND

McNEIL CAMPGROUND

RILEY CAMPGROUND

RAMONA FALLS CAMPGROUND

TIMBERLINE TRAIL

WILDCAT CAMPGROUND

CLEAR CREEK CAMPGROUND

Wildwood Recreation Site

DEVILS MEADOW CAMPGROUND

ROBINHOOD CAMPGROUND

TOLLGATE CAMPGROUND

ALPINE CAMPGROUND

HOOD RIVER MEADOW CAMPGROUND

CAMP CREEK CAMPGROUND

BADGER LAKE CAMPGROUND

MIRROR LAKE CAMPGROUND

STILL CREEK CAMPGROUND

HUNCHBACK TRAIL

LOOP TRAIL SYSTEM

CAMP WHITE CAMPGROUND

GREEN CANYON CAMPGROUND

TRILLIUM LAKE CAMPGROUND

DEVILS HALF ACRE CAMPGROUND

BONNIE MEADOWS CAMPGROUND

KINZEL LAKE CAMPGROUND

FIR TREE CAMPGROUND

GRINDSTONE CAMPGROUND

LOWER TWIN CAMPGROUND

MUD CREEK CAMPGROUND

BARLOW CREEK CAMPGROUND

FROG LAKE CAMPGROUND

BARLOW CROSSING CAMPGROUND

PACIFIC CREST NATIONAL SCENIC TRAIL #2000

- PICNIC FACILITIES ONLY
- OVERNIGHT FACILITIES ONLY
- PICNIC AND OVERNIGHT FACILITIES
- HIKING TRAILS

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

0 1 Miles

Figure 8

SELECTED RECREATION FACILITIES

Mt. Hood Planning Unit

Wilsey & Ham — June, 1975

The following are defined as uses which are popular in the Mt. Hood area:

- Hunting
- Boating
- Camping
- Picnicking
- Walking, urban (includes nature walks)
- Hiking (trail oriented)
- Horseback Riding (trail)
- Non-trail Riding
- Snow Activities (developed areas inc. skiing)
- Snow Activities (undeveloped - snowshoeing, cross country skiing, hiking, etc.)
- Fishing
- Outdoor Games
- Pleasure Driving
- Golf

USER STANDARD

The user-standard approach used by the Oregon Outdoor Recreation Study is accepted for the present study. That approach projects the demand for each activity on a per unit basis giving each activity a maximum number of people per unit for optimum recreational experience (10) (C.3).

DEMAND PROJECTION PROCESS

The Oregon Outdoor Recreation Study determines recreational demand on the basis of regional geographic areas, titled State Administrative Districts. The Planning Unit is composed of sections of State Administrative Districts No. 2 and No. 9. District No. 2 contains Clackamas, Washington and Multnomah Counties, while District No. 9 includes Hood River, Wasco and Sherman Counties. Information is available

on the number of units of each recreational activity available in each district (i.e. number of campsites, picnic tables, etc.). Since these geographic areas are too large for meaningful analysis, the number of units of each recreational activity occurring in the Planning Unit was inventoried and became a base for determining demand (C.4).

RECREATION DEMAND IN THE PLANNING UNIT

For the purposes of this analysis, recreational demand is determined by evaluating specific facility demands rather than project visitor day demands. This approach is used in order to determine what types of facilities and/or activity areas are most needed within the Planning Unit. Table 1 illustrates the recreational demand projection by facilities for the Planning Unit.

The present recreational activity within the Planning Unit is largely "non-facility" oriented. Pleasure driving, sight-seeing and hiking account for a large proportion of the use of the Mt. Hood area. The Planning Unit is the only portion of the Mt. Hood National Forest to be bisected by major state roads, and as such is a natural place for people to go for a "Sunday drive."

Winter activities, especially skiing, are the largest facility-oriented use within the Planning Unit. In addition, of the available picnic sites in the seven-county area contained in Districts 2 and 9, only 7 percent occur within the Planning Unit.

THE RECREATION SITE TODAY

The Recreation Site is a popular day-use recreation area, ideally suited for use by residents of the Portland metropolitan area. Picnicking is the primary activity and facilities are available for both family

and group picnics. A variety of facilities are provided including picnic tables, charcoal grills, play areas, running water and flush toilets. At the current time,reservations are suggested for use of the larger group facilities. Approximately 900 people can be accommodated on the Recreation Site at one time (C.7).

The Recreation Site offers much in the way of historic and natural resources. It is traversed by Salmon River which bends as it crosses the site creating a natural canyon and also provides excellent fishing opportunities. Douglas fir, western red cedar, western hemlock, red alder and big leaf maple provide ample shade and there are large areas of vine maple clusters, Oregon grape and sword fern as well. (15) The Recreation Site also offers a section of the Barlow Road, the first road to pass around the southside of Mt. Hood. Although originally located north of the Recreation Site, the road was relocated in 1882 and is still visible just inside the entrance. That road has recently been elected to the National Register of Historic Places.

In 1974, 105,880 people used the Recreation Site during a season which extended from April 22 to October 14. Use was heaviest during late July and the month of August up to and including Labor Day weekend.

ACTIVITY DEMAND IN THE PLANNING UNIT AND THE RECREATION SITE'S ROLE IN FILLING IT

Table 1 identifies the percentage of the regional recreational activities available within the Planning Unit, while Table 2 illustrates the facilities required to support those activities and the current availability of those facilities at the Recreation Site.

A demand of high, moderate, or low is given for each activity as defined below:

High: A percentage demand of over 15% (Table 1) or any activity showing a high net need for acreage, miles or facilities.

TABLE 1

RECREATION DEMAND IN THE MT. HOOD PLANNING UNIT

ACTIVITY * and unit of measure	Gross Needs 1970	Gross Needs 1990	Net Needs 1970	Net Needs 1990	Existing Facilities in Dist. 2&9	Existing Facilities in Planning Unit	Percentage of total in Planning Unit	1990 Needed new in Planning Unit	1990 New Facilities Needed User Equivalents
Hunting (acre)	2,179,097	4,429,623	875,386	3,125,912	1,303,711	121,000	Most public lands are open to hunting		
Boating (launch lane)	166	338	89	261	77	2	3%	8	1,400
Camping (site)	3,969	8,069	1,488	5,588	2,481	582	23%	1,285	10,280
Picnicking (site)	4,305	8,752	+1,521	2,926	5,826	385	7%	204	1,428
Walking (mile)	963	1,958	-	-	-	-	-	-	
Hiking (trail mile)	482	980	+ 387	553	869	207	24%	132	1,320
Horseback Riding (trail mile)	326	662	+ 387	553	713	207	29%	160	640
Horseback Riding - (open country)	-	-	-	-	-	-	-	-	
Snow activities (acre)	6,621	13,458	-	-	-	-	-	-	
Fishing (mile of stream)	1,802	3,663	1,072	2,411	Most streams are open to fishing				
Golf (hole)	666	1,355	333	1,022	333		5%	51	1,275
Outdoor Games (acre)	2,693	5,474	1,675	4,456	1,018		-	-	
Pleasure Driving (mile)	622	1,263	-	-	-	-	-	-	

*See Appendix Item C.5 for definitions and explanatory notes

Source: From data compiled by Oregon Outdoor Recreation Plan and Hood Input Planning Team

TABLE 2

ACTIVITY DEMAND IN THE PLANNING UNIT & SITE REQUIREMENTS TO FILL THEM

ACTIVITY	DEMAND	SITE FACILITY REQUIREMENTS	SITE FACILITIES AVAILABLE AT THE RECREATION SITE
Hunting	High	75 acres per hunter (27)	-0-
Boating	Moderate	Boat launch access lanes	-0-
Camping	Moderate	Picnic tables, parking, fireplaces, tent or trailer space, water and toilet facilities	-0-
Picnicking	Moderate	Picnic tables, parking, fireplaces, water and toilet facilities	101 family picnic units (505 picnickers) group facilities for 410 picnickers
Walking	High	None	Section of old Barlow Road, Salmon River Canyon, other interesting areas to walk through
Hiking	High	Trails, trailheads	Potential access to USFS trails by developing connector on southside of Salmon River
Horseback Riding (Trail)	High	Trails, trailheads, trailer parking	Potential access to USFS trails by developing connector on southside of Salmon River

TABLE 2 (Continued)

ACTIVITY DEMAND IN THE PLANNING UNIT & SITE REQUIREMENTS TO FILL THEM

ACTIVITY	DEMAND	SITE FACILITY REQUIREMENTS	SITE FACILITIES AVAILABLE AT THE RECREATION SITE
Horseback Riding (open country)	Moderate	None	-0-
Snow Activities	High	Lodges, tows, other ski equipment, toboggan and sled runs	-0- weather is not usually cold enough for significant snow
Fishing	High	Access to water	Salmon River is stocked and accessible
Golf	Moderate	Golf course, lodge	-0-
Outdoor Games	Moderate	Developed playfields for specific sports, freeplay space	Baseball and volleyball courts, free play space
Pleasure Driving	High	Roads	-0-

Moderate: A percentage demand of 5-15% (Table 1) or any activity showing a moderate net need for acreage, miles or facilities.

Low: A percentage of 5% (Table 1) or less, or little to no net need for acreage, miles or facilities.

THE FUTURE OF THE RECREATION SITE IN THE PLANNING UNIT

The future of the Recreation Site will be greatly affected by the choice of one of the four alternative futures presently being discussed by the Hood Input Team. Each alternative future will affect the Recreation Site and demand for its use in a different manner (C.9):

Future I: Selection of Future I would stress a continuation of the existing trends, with little or no change in projected supply and demand calculations.

Future II: Selection of Future II would stress multiple-use of the resources of the Planning Unit and would emphasize a cooperative interagency approach to land use and recreational planning. Implementation of this alternative would provide for an enhancement of the relationship between the physical characteristics of the recreational sites and the recreational activities they support.

Future III: Selection of Future III would stress maximum resource production within the Planning Unit and would seek to limit the extent of other non-compatible uses, such as recreation, housing, etc. Although implementation of this alternative could cause a lessening

of demand for the recreational facilities at the Recreation Site, it is possible that demand would increase due to a potential decrease in the per capita number of recreational facilities available.

Future IV: Selection of Future IV would stress maximum recreational development within the Planning Unit. Recreational use would increase as new facilities of all types were constructed. It is probable that demand for the facilities at the Recreational Site would increase due to the "shopping center effect" of drawing people to the area for a variety of recreational experiences. However, it is expected that use of the Recreational Site would not increase proportionally to the use in the total Planning Unit due to the total overall increase in the new recreational facilities within the Planning Unit.

SUMMARY OF CONCLUSIONS AND FEASIBILITY

This section will summarize the salient features of the individual elements that have been investigated in this analysis, describe their conflicts or problems with existing recreation uses and discuss the feasibility of expanded uses on the Recreation Site. Additionally, special attention will be given to the question of the feasibility of sub-surface sewage disposal and some of the parameters for the location of a pedestrian bridge crossing Salmon River.

RECREATION DEMAND

Fourteen recreation uses were investigated within the Planning Unit. The Recreation Site is seen to have the general characteristics to accommodate seven of those major categories of uses (disregarding at this point any physical limitations of the Recreation Site).

1. Overnight Camping
2. Picnicking
3. Walking
   - General Purpose Walkways
   - Special Purpose Walkways
4. Hiking Trails and Trail Head
5. Horseback Trails and Trail Head
6. Fishing
7. Outdoor Games

Of these seven, the demand analysis concludes (see Table 1) that the greatest unmet demand within the Planning Unit is for overnight camping. The demand for 1,285 new camping sites by 1990 represents over twice the number currently existing. The demand for overnight camping is heaviest in the summer months although demand exists in the winter months as well. Winter camping demand occurs principally from weekend skiers. The location of the Recreation Site is well suited to accommodate this demand since it is relatively snow free during much of the winter and yet still close to the Mt. Hood ski areas.

Summer camping demand occurs both for single night, transient campers and camping of several nights duration.

In relation to other existing camping facilities in the Planning Unit, the Recreation Site best fulfills the demands for the single night, transient camper.

Of the existing picnic facilities in the Planning Unit, the Recreation Site currently accommodates approximately 25 percent of that total. The demand for new facilities by 1990 is equivalent to slightly more than half again the amount already existing. If the Recreation Site accommodates a proportional amount of that demand another 50 picnic units would be needed by 1990.

A significant factor with regard to picnic facilities is that only 7 percent of the total demand for picnic facilities in the Portland Region Recreation Planning Districts is accommodated in the Planning Unit. The conclusion seems clear that while there is demand for picnicking in the Planning Unit, most people enjoy their picnic experience elsewhere, most likely in parks closer to the urban areas. The priorities for accommodating additional picnicking demand in the Planning Unit seem low therefore, and would most probably be accommodated by either the addition of individual units combined with other facilities or by the expansion of an existing picnicking facility such as the Recreation Site. It is doubtful that a new, major picnicking facility would be developed.

The demand for trails and trail facilities, while not nearly so high as camping in actual units of demand and user equivalents, is a significant demand in the Planning Unit insofar as total demand in the Recreation Planning Districts. The Planning Units clearly provides a large proportional share of trails within the general Portland region so that the Planning Unit will play a key role in accommodating future demand. The only real significance that this represents to the Recreation Site is in its potential to provide a trail connecting point. The Recreation Site itself will not accommodate any of the actual trail demand.

A major part of the question of recreation demand to the Recreation Site is the current discussion of planning futures for the Planning Unit by the Hood Input planning team. The four alternatives proposed are designed to project futures for the Planning Unit that range from use of the area almost totally for its natural resource value to intensive recreation development. While in a planning perspective, these alternatives

represent viable choices, the realities of existing conditions (the existing commitment of resources by both private and public agencies and individuals, the general public image of Mt. Hood as a recreation focal point and conversely a general public attitude that Mt. Hood is a resource deemed worthy of some degree of protection or limitation on its use, and the lack of a substitute facility or set of facilities by which to accommodate recreation demand) would seem to preclude all but alternatives 1 and 2. Alternative 1 represents no change from the way things are done now and is presumed not viable since the existing circumstances apparently led to the initiation of the current planning effort. Alternative 2, a coordinated planning approach for the entire Planning Unit, seems therefore to be the only truly realistic alternative.

To the BLM in making decisions on future utilization of the Recreation Site, the adoption of Alternative 2 for the Planning Unit would serve to insure that overall recreation demand would be allocated throughout the Planning Unit on the basis of demand characteristics and site suitabilities, limitations and characteristics. The resultant effect would be the development and utilization of facilities without fear of duplication, oversupply or underutilization.

THE FEASIBILITY OF EXPANDED USES ON THE RECREATION SITE

Recreation demand is one element of feasibility but taken by itself could lead to faulty conclusions. Matching demand with site characteristics, suitabilities and limitations is a better indicator of total feasibility.

The geologic origins of the Recreation Site have created a site of unique character. The heavy vegetation, the relationship to Salmon River and the unique surface drainage conditions on the south side of Salmon River, all are reflective of the origins of the general area. These characteristics are also a major part of the high recreation value that the Recreation Site represents. Unfortunately, many of these characteristics are also the cause of existing and potential conflicts with recreation uses.

The single major problem that exists for both current and potential uses of the Recreation Site is the fluctuation and surfacing of the ground water table. From this condition, the majority of all other problems originate, including problems with the existing subsurface sewage disposal system, the fragility of vegetation to human traffic and the difficulty of the Recreation Site to accommodate use in the wet winter season.

Figure 9 illustrates a division of the Recreation Site into a series of nine planning areas. Figure 11 is a summary of the greatest limitations and the suitabilities for use within those planning areas. Figure 10 is a summary of potential uses by planning areas.

Figure 10 SUMMARY OF POTENTIAL USES BY PLANNING AREAS

POTENTIAL USES	PLANNING AREAS 1	2	3	4	5	6	7	8	9
Overnight Camping			●	●	●	●	●	●	
Picnicking		●	●	●	●	●	●	●	
General Purpose Walkways	●	●	●	●	●	●	●	●	
Special Purpose Walkways (Interpretive trails, etc.)	●								●
Hiking Trails									●
Trail Head						●	●	●	
Horseback Trail	●								●
Fishing						●	●	●	
Outdoor Games		●	●	●	●	●	●	●	

Figure 11 - Summary of Recreation Limitation and Suitability on the Recreation Site

PLANNING AREA	GREATEST LIMITATION FOR RECREATION USE *	MOST SUITED USES
1	• Some minor surface water drainage problems on east side of access road • close proximity to highway • relatively dense forest cover with moderate to slight understory •	• General Purpose Walkways • Special Purpose Walkways • Horseback Trail
2	• Existing Group Activity Area • some surface drainage problems between two access roads • high organic matter content in some soils • high water table in wet season in currently unused portion of area •	• Limited expansion of existing facilities possible for dry season use
3	• Surfaced water table in wet season • relatively fragile understory vegetation, particularly in wet season • southern river edge subject to extreme erosion from stream cutting, rock falls and landslides representing extreme safety hazard •	• All uses possible except hiking and horseback trails, trail heads, and fishing • All uses limited in wet season
4	• Northern half of area limited by surfacing water table and poor surface water drainage in wet season • highly disturbed vegetation from previous cutting practices in northern area particularly •	• Overnight Camping • Picnicking • General Purpose Walkways • Outdoor Games • All uses limited in northern portion in wet season
5	• Some limitation from surfacing water table in wet season in northeast portion of area • some minor slope limitations in northeast portion •	• Overnight Camping • Picnicking • General Purpose Games • Outdoor Games • All uses limited in northeast portion in wet season
6	• Extreme hazard in steep slope areas at river edge due to erosion from stream cutting, rock falls and landslides • some limitation from surfacing water table in wet season in eastern portion of area •	• All uses except hiking and horseback trails • Limited fishing suitability because of hazard areas
7	• Existing Family Picnic Area • limitation over most of undeveloped area from surfacing water table in wet season • flooding potential from high river flows particularly in existing development • steep slopes at eastern edge of area •	• Limited expansion of existing facilities • Fishing well suited • Expansion of uses in undeveloped areas limited in wet season
8	• Steep slopes in portions of river edge • extreme hazard from rockfalls and landslides western portion of river edge • some wet season surface water occurs in central portion of area • requires access across other planning areas •	• All uses except hiking and horseback trails • Limited suitability for fishing due to hazard
9	• Wet surface conditions throughout the area during wet season • ponds existent during most of year • fragile vegetation • relatively unstable soils with high organic content •	• All uses limited by fragile conditions • Hiking and horseback trail connections possible • Special purpose walkways • Group/family uses inappropriate

* Does not include consideration of sub-surface sewage disposal

THE FEASIBILITY OF SUB-SURFACE SEWAGE DISPOSAL ON THE RECREATION SITE

Sewage Disposal Calculations

Sub-surface sewage disposal systems have several design parameters including, the actual design of the system, the construction techniques used, the chemical characteristics of the wastes, the rate of hydraulic loading, the topographic conditions of the drainfield area, the physical and chemical composition of the soils, and the characteristics of use and maintenance of the disposal system. Of these, two are key to a determination of the size of the system needed for a given application.

1. The Biochemical Oxygen Demand (BOD) loading
2. The rate and volume of hydraulic loading

BOD is measured in pounds/capita/day and for picnic areas is very low, being approximately .01 pounds/person/day (1). This means that one hundredth (.01) of a pound of pure oxygen would be used up in the purification process for each visitor each day. The need for oxygen is the basic reason that the drainfield trenches must be shallow and are limited to a maximum depth of 36 inches. Soils will remain aerobic, however, under loading rates of hundreds of pounds per acre per day, therefore, treatment is limited more by the hydraulic loading of the soils than by organic loading.

The total effluent volume for a given area of infiltration is the measure of hydraulic loading. Soils which are generally acceptable for sub-surface sewage disposal are coarse sandy loams to loamy sands. Taking into consideration all the criteria in present Department of Environmental Quality (DEQ) standards, the better loamy sands are capable of receiving a loading of one gallon of effluent/one square foot of trench sidewall/day. This data converted to surface area requirements means that a drainfield 116 by 116 feet (0.3 acres) is capable of handling the design loading requirements of five gallons/person/day for 1000 persons.

In 1973 BLM records indicate the total amount of water pumped at the Recreation Site was 256,000 gallons during the April to October season. Approximately 100,000 visitors used the Recreation Site during this

period of time. Though the accepted design standards for recreation facilities is five gallons of water use/person/day the actual usage appears closer to 2.5 gallons/person/day. This figure is in general agreement with usage rates in parks operated by the State Parks and Recreation Branch of the Oregon State Highway Division.

Potential Sub-Surface Sewage Disposal Areas

Three potential sub-surface sewage disposal areas were identified on the Quaternary terrace alluvium which either meet present DEQ standards or are capable of being modified to meet those standards. It should be pointed out that the standards prohibit vehicular traffic or paving of the surface overlying a drainfield. Further, the use of the surface overlying a drainfield for playfields or other similar uses will lower the efficiency of the purification process because of soil compaction and a resultant reduction in the aerobic capabilities of the soil. Figure 9 illustrates the three potential sub-surface sewage disposal areas.

Area I

The prominent east-west ridge within planning areas 3 and 8, consists of a loamy sand to fine sandy loam (soil 4 CD, figure 4) and is capable of sub-surface sewage disposal without modification (D.1). The primary restrictions for the placement of drainfields in this area would be to maintain a minimum distance of 100 feet between the drainfield and Salmon River. Additionally, to insure no surfacing of effluent from lateral movement, a minimum of 100 feet is necessary from the drainfield to the mapped marshland areas (see figure 2).

There are approximately ten acres which can adequately support drainfield systems in this area. Their proper design and placement will allow the quantity of sewage disposal according to the calculations of the previous section, with no danger to pollution of the aquifers in the Rhododendron formations, which at this location are 20 to 26 feet below the surface.

Area II

Continuation of the east-west ridge to the west of the access road, generally in planning areas 4 and 5, is the same soil and ground water conditions as exist in Area I. The same capabilities and limitations exist in this area as do in Area I except that the size and configuration of the area is considerably more restrictive. Approximately three acres of usable area which will adequately support drainfield systems.

Area III

The wide alluvial terrace northeast of the Family Picnic Area parking lot consists of a loamy sand to fine sandy loam (soil 6-A, figure 4). There are approximately four and one-half acres which could adequately support drainfields but would require modification because of the fragipan present from 16 to 28 inches below the surface. To meet minimum DEQ standards, a mound-type drainfield system would be required.

There are some disadvantages to a mound-type of drainfield. First, the construction cost would be high, as an engineered graded soil would need to be prepared and brought to the area: The drainfield would require nearly ten times the area required at either Area 1 or 2 thereby reducing the use capacity of the recreation site. Finally, the constructed mounds would require a fence enclosure to keep visitors from walking on and ultimately destroying the drainfield.

A PEDESTRIAN BRIDGE CROSSING SALMON RIVER

In anticipation of the possibility of a desire to provide pedestrian access across Salmon River, a special analysis was conducted using data gathered in this study. The analysis was not conducted with information sufficient to determine foundation structural characteristics, rather only information relative to limitations or suitability for pedestrian traffic in the general vicinity of a bridge. The exact location of a bridge must also consider the connecting uses and of course, structural factors of foundation geology. Figure 8 shows the most suitable locations for such a facility.


PROPERTY LINE
9
8
3
4
5
6
7
1
2
A
B
C
SALMON RIVER
B. L. M.
1,285.20'
N. 89° 52' W
N. 00° 42' E.
1,323.26'
PRIVATE PROPERTY
Phase I
Phase II
POTENTIAL SUB-SURFACE SEWAGE DISPOSAL SITES
GEOLOGIC HAZARD AREAS
RECREATION PLANNING AREAS
POTENTIAL PEDESTRIAN BRIDGE LOCATIONS
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
0
200
Feet
Figure 9
STUDY SYNTHESIS
Wildwood Recreation Site
Wilsey & Ham
June, 1975

APPENDIX A - SUB-SURFACE CONDITIONS

GEOLOGY

A.1 Yakima Basalts (Upper Miocene)

The Yakima Basalt is a series of layered tholeiitic flood basalts. Flows average in thickness from 25 to 100 feet and are interbedded occasionally with pyroclastic and sedimentary units which may act as impermeable layers. The entire group of flows reach thicknesses of greater than 2500 feet. Source areas for the flows are thought to be east and northeast of the Wildwood vicinity in Oregon and Washington. The Basalt is commonly silica rich with a glossy ground mass. It is dark gray to black in color, fine-grained, dense, hard, with medium to coarse joint (a few inches to a few feet) in the columnar, block or hackly forms, and is slightly deformed.

A.2 Rhododendron Formation (Upper Miocene)

The Rhododendron formation was first defined by Barnes and Butler (3) as consisting of conglomerates and agglomerates with some interbedded andesite flows. The top of the formation is marked by younger hypersthene andesite. The Rhododendron formation nears its maximum thickness of 1400 feet (4) at its type locality, Zig Zag Mountain, approximately four miles due east of the Recreation Site.

In the mapped area (figure 1) on the Recreation Site, the unit is composed almost entirely of a poorly sorted conglomerate with minor portions agglomeratic and a few thin interbeds of tuff. The clastic materials range from sand size to boulders which are composed primarily of andesite, although ones of volcanic breccia are common. They are rounded to subangular and layering is present in places. A dip of about 6 degrees northeast was measured, a local dip possibly indicative of a nearby source or filling in an already present structural low in the Yakima Basalts.

GROUND WATER

A.3 Ground Water Occurrence in Geologic Units
(See also Table A-1)

Yakima Basalt

This rock unit is not exposed on the Recreation Site but does crop out downstream along Salmon River and at several localities in the Sandy River drainage. A well in Section 30, T2S, R7E approximately two miles north of the Recreation Site was drilled to a depth of 486 feet in Yakima Basalt. A confined aquifer 13 feet thick was encountered at a depth of 469 feet. The hydrostatic pressure in that aquifer lifted the water 442 feet to a piezometric level of 27 feet below land surface.

Basal Rhododendron Formation

Several wells are known to have penetrated an artesian aquifer in the basal sands and gravels of the Rhododendron formation. The BLM well at the Recreation Site is a flowing artesian well from an aquifer between 87 and 103 feet below the land surface. The initial flow in October, 1972, was 80 gallons per minute.

A flowing artesian well (Northrup Well) is located in Section 30, T2S, R7E, north of the Recreation Site from a sand aquifer at a depth of 85 feet. Another basal Rhododendron formation well is located at Zig Zag Ranger Station in Section 3, T3S, R7E.

Upper Rhododendron Formation

The shallow well at the Recreation Site produces at least 100 gallons per minute from an aquifer in the Rhododendron formation. Primary water production occurs between 28 to 41 feet in sand and gravel. The upper Rhododendron formation probably has a number of perched water table aquifers in the Mt. Hood region. It is difficult

TABLE A-1

GROUND WATER OCCURRENCE IN GEOLOGIC UNITS

Geologic Age	Mapping * Symbol	Geologic Units	Occurrence of Ground Water
Quaternary	Qm	Marsh or Wetlands	
		Accumulation of organic material over loamy sand. Iron oxide fragipan at shallow depth	Ponded water & perched ground water above iron oxide fragipan, water high in organic material
	Qal	River Alluvium	
		Cobbles, gravel & sand. Source of material from terrace deposits and rhododendron formation. Alluvium is 13" thick at BLM pumphouse	Water table from 2' to 5' below surface. Highly permeable with hydraulic connection to Salmon River. Regionally produces water for domestic use
	Qt	Terrace Deposits	
		Bedded gravels, sands and silts. Thickness variable; thin at northern edge of Recreation Site. Thickest deposits in S.E. - N.W.	Some perched water at shallow depth above Rhododendron formation at Group Activity Area. Regionally, of importance as aquifer.
Upper Miocene	Mr	Pyroclastics, Water Laid Volcanics & Pumice Beds	
		Inferred to occur at a shallow depth beneath all other geologic units at Recreation Site.	Perched water at various depths. Water table aquifer at 28' in BLM well. Base of formation regionally important as artesian aquifer.

* See Figure 1

to accurately analyze the ground water potential of this formation due to the rapid change in lithology between well locations.

Terrace Deposits

Aquifers are limited in this unit. A well 14 feet deep at the Baptist Camp at Arrah Wanna, Section 5, T3S, R7E, possibly produces from the terrace deposits. This is not an important aquifer and is not considered a good source of ground water.

River Alluvium

Ground water is known to occur in the recent alluvium adjacent Salmon River and its tributaries. The water table is very shallow, generally within five feet of the surface. There are no known wells in the river alluvium near the Recreation Site. This is not considered a good source of ground water.

TABLE A-2

WATER QUALITY TEST RESULTS
(March 25, 1975)

Sample Number	Coliform Fecal (MPN)	Coliform Total (MPN)	pH[1]	Nitrate - Nitrite	Chloride	Sampling Location[2]
1	Negative	240	No Reading	None Detected	None Detected	S.W. corner of Phase II
2	Negative	240	No Reading	None Detected	None Detected	S.E. corner of Phase II
3	Negative	25	No Reading	None Detected	None Detected	Stream at Phase II Road junction.
4	Negative	4	No Reading	None Detected	None Detected	Salmon River at Pumphouse
5	Negative	6	No Reading	None Detected	None Detected	Bank seepage from overflow channel westside of Phase I near restrooms
6	Negative	8	No Reading	None Detected	None Detected	Bank seepage from overflow channel eastside of Phase I near restrooms
7	Not Tested	Not Tested	No Reading	None Detected	None Detected	Overflow channel under bridge near central restroom, Phase I
8	Not Tested	Not Tested	9.2	None Detected	None Detected	Water tap restroom westside Phase II

[1] The colorimetric method was used for pH sampling. Interference from color, oxidents or reductants caused the no reading for samples 1 through 7. The reading in sample 8 is considered invalid since the water system had not flushed during the winter.

[2] See figure 1.

A.4 Transpiration Losses

Transpiration loss is related to the type of vegetation growing on a site. Evergreen conifers which keep their needles the year around can draw on soil moisture at any time temperatures permit (usually about 42° F. or 6° C.), but deciduous hardwoods have leaves and transpire only during the warm growing season, April-October. Most of the hardwoods have lost their leaves, or at least lost most leaf function, by the end of September. During the warm growing season, both conifers and hardwoods transpire approximately the same amounts of water, according to studies in areas with similar species and climates (5, 6, 7). Plants can continue to draw water as long as water is available and growth continues, but are limited by climate. Seasonal losses, according to those studies, vary from 20 to 30 inches. Records at the Zig Zag Ranger Station indicate that transpiration losses in the general Wildwood vicinity average 24.8 inches for the year and 20 inches for the period of April through September (8). Monthly distribution of transpiration draft correlates approximately with temperature, so for the general Wildwood vicinity, monthly transpiration rates will be as follows:

Month:	Apr.	May	June	July	Aug.	Sept.
Transpiration, inches	1	2	4	7	5	1

Forest soil at the Recreation Site will hold from one-half to one inch of moisture per foot of depth, and the average forest soil depth in the area runs about two and a half to three feet (Table B-1, Appendix B).

Thus with available moisture holding capacity at three to three and one half inches and transpiration draft during July approximately seven inches, the total moisture deficiency during this peak period is approximately three and one half inches.

APPENDIX B - SURFACE CONDITIONS

SOILS

B.1 Survey Methodology

The field portion of the study was conducted utilizing the same procedures employed by the Soil Survey Division of the U. S. Soil Conservation Service (SCS). All descriptions were prepared in accordance with the Soil Survey Manual of the Soil Survey Division. Aerial photographs were utilized extensively in delineating and interpreting the complex patterns of soil distribution. Slope separations parallel those in general use by the SCS and are of importance in developing interpretative data for each of the mapping units. Correlations between plant communities and the nature of the underlying soils, established early in the study, proved to be an extremely valuable tool for the delineation of the various soil systems. Delineations were transferred to the soils map (figure 4) utilizing a Saltzman projection unit, and their location is very close to those initially placed during the field work.

Analytical laboratory work was conducted at the Montana State University, Soil Resources Laboratory during April and May, 1975 and was used principally to check conclusions reached during the field studies (Tables B-3 and D-1, Appendices B and D).

The average permeability for horizons, entire pedons and other types of similar data are given (Tables B-1 and B-2) in ranges and based on data published in the Soil Survey Manual and in a wide variety of SCS Soil Survey Reports. In most instances, the correlative data was transferred from similar soil series and compared to series from different locations to make sure the ranges were representative of the particular soil involved. As a part of the study, collations were made with the analytical data generated, when applicable.

TABLE B-1

SOIL PROPERTIES AND QUALITIES

MAPPING UNIT	SOIL COMPONENTS	DOMINANT SOIL TEXTURES	DEPTH TO RESTRICTING LAYERS	PERMEABILITY (1)	AVAILABLE MOISTURE CAPACITY	PHYSIOGRAPHIC POSITION
1-A	Series A - Model sites Series A - thick epipedon variant	0 to 14" coarse sandy loam to heavy sand soil textures ranging from sand to loam	12 to 20" over highly indurated fragipan	Moderately rapid above over fragipan which has very slow to none	0.15 to 0.30" in upper 6", 0.10 to 0.20" below to the fragipan	0 to 2% slopes on higher on north and east sides of Wildwood although found in lower position south of river
1-B	Series A Series A - shallow fragipan variant Series A - thick epipedon variant	As above and has a tendency to become slightly coarse textured	8 to 18" over fragipan	Moderately rapid to rapid over fragipan	0.15 to 0.35" in upper 8", 0.10 to 0.20" below to fragipan	3 to 5% slopes on beaches throughout the shady area
1-C	Series A Series A - shallow fragipan variant	0 to 10" loamy sand, fragipan underlain with sand to sandy loams	6 to 12" over fragipan	Moderately rapid to rapid over fragipan	0.15 to 0.25" in upper 6 to 12"	5 to 9% slopes on moderately steep slopes transitional between beach levels to north central portion of study area
2-A	Series A Series A - shallow fragipan variant Series A - histic shallow variant	0 to 60.8" heavy loamy sand 0 to 8" organic magerial	4 to 14" over fragipan	High organic matter content moderately low	Histic 0.1 to 0.5" remainder as in 1-B	0 to 20% slopes on large level center beach section
3-AB	Series A Series C Series A - shallow fragipan variant Series A - histic shallow variant	As above in 2-A 0-8" organic matter	6 to 18" over fragipan, Series C has only incipient type	Histic epipedon moderately slow, moderately rapid over fragipan	C 0.05 to 0.15", Histic 0.2 to 0.5, remainder 0.15 to 0.30"	Narrow remnant of material slightly elevated from base level in central portion
4-D	Series B (80 to 95%) Series B stony phase (5 to 20%)	Deep coarse sandy loam to loamy sands	Incipient fragipans at depths to 30"	Moderately rapid to moderate	0-10 to 0.25" to 6" 0.15 to 0.35" below to 24", 0.05 to 0.20" below	Oatwash remnant forming the escarpment between the beaches and ridge on northside of river
4-CD	Series B	0 to 6" heavy sand 6 to 20" fine sandy loam to heavy fine sand 20" + heavy sand	24 to 40" to incipient fragipan which is not always present	Moderate to moderately rapid	0-10 to 0.25" to 6" 0.15 to 0.35" below to 24", 0.05 to 0.20" below	Oatwash remnant forming the escarpment between the beaches and ridge on northside of river
5-A	Series C Series A - shallow fragipan variant Series A	Series C/S sand and loamy sand	Series C none 6 to 15" to fragipan	Series C is rapid to very rapid, moderately rapid in others to fragipan	0-10 to 0.30" in upper 6", Series C is 0.04 to 0.15"	Recent floodplain with pockets of current riverwash sediment deposition
6-A	Series D	0-8" loamy fine sand 8-20" fine sandy loam	16 to 28" over fragipan	Moderately rapid to rapid to 8" then moderately rapid	0.10 to 0.25" to 8", 0.15 to 0.35" to 20"	0 to 2% slopes, nearly level beach between major escarpments
7-BC	Series A - shallow fragipan variant Series C - gravelly phase SEries C	Series C is sand and coarse, heavy sand and series A is heavy sand over fragipan	Series C has none Series A is 0 to 14"	Series C is rapid Series A is moderately rapid	Series C is 0.05 to 0.15", series A is 0.10 to 0.25"	0 to 9% slopes abandoned river channel

(1) Permeability in inches/hour: very slow = 40.05", slow = 0.05 to 0.20", moderately slow = 0.20 to 0.80", moderate = 0.80 to 2.50", moderately rapid = 2.50 to 5.00", rapid = 5.00 to 10.00", very rapid = 10.00"

TABLE B-1 (Continued)

SOIL PROPERTIES AND QUALITIES

MAPPING UNIT	SOIL COMPONENTS	DOMINANT SOIL TEXTURES	DEPTH TO RESTRICTING LAYERS	PERMEABILITY (1)	AVAILABLE MOISTURE CAPACITY	PHYSIOGRAPHIC POSITION
8-A	Series A - shallow gravelly variant Series A - histic shallow variant Series A - shallow fragipan variant	0-8" heavy loamy sand 0-8" organic material	4 to 14" over highly indurated fragipan	High deposit matter content results in moderate to above permability	Histic varriant 0.2 to 0.5" remainder as in 7-BC	0 to 1% slope, nearly level low terrace or beach
9-AB	Series A - shallow fragipan variant Series A - shallow fragipan and cemented gravel variant	0-8" of loamy sand over cemented horizons	6-9" over fragipan or cemented gravels	moderately rapid to rapid over fragipan	0.15" to 0.30" in upper 4-6" and 0.10 to 0.20" to fragipan	0-2% slopes on low beaches near the river
10-DE	Misc. land type - steep escarpments along river					
11-A	Series A - deep fragipan variant	Loamy sand to 8" then heavy loamy sand to coarse fine sandy loam	10 to 24" over indurated fragipan	Moderately rapid to to rapid dependent on organic matter content	0.10 to 0.25" in upper 8 to 10", 0.10 to 0.20" in sand and materials underlying fragipan	0 to 2% slopes, nearly level beach south of river
12-AB	Series E Series A - histic shallow variant Series C	Organic materials in Series E, organic material over fine sand in Series A, sand and loamy sand in Series C	Glei horizons at varying depths	Very slow in Series E, moderate to moderately slow in Series A, rapid in Series C	0.2 to 0.8" but wide variations Series 0.05 to 0.20"	Swale and pond edges

(1) Permeability in inches/hour: very slow = 40.05", slow = 0.05 to 0.20", moderately slow = 0.20 to 0.80", moderate = 0.80 to 2.50", moderately rapid = 2.50 to 5.00", rapid = 5.00 to 10.00", very rapid = 10.00"

TABLE B-2
SOILS SERIES DESCRIPTION

Series A

Depth	Horizon	Description
0-4"	(A_1)	Black (10YR 2/1)* To dark grayish brown (10YR 4/2) dry, coarse silt loam; weak medium to coarse granular structure; soft when dry and friable when moist; many roots; large amounts of organic matter, only partially decomposed in the upper portion; noneffervescent; lower boundary is clear and wavy.
4-6"	(A_2)	Very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) dry fine sandy loam to loamy fine sand; incipient albic horizon; many of the quartz grains are bleached of the iron and aluminum sesquoxide coatings; fewer roots than in either horizons above or below; noneffervescent; lower boundary is abrupt and wavy.
6-9"	(B_1)	Very dark brown to very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2)dry, loamy fine sand and fine sandy loam; very weak moderate subangular blocky structure; slightly hard when dry, friable when moist; much variable coloration when not crushed ranging from brown (10YR 5/3), strong brown (7.5 YR 5/6), dark brown z(7.5YR 3/2) and dark reddish gray (5YR 4/2); much iron and organic straining; many roots; noneffervescent; lower boundary is abrupt and wavy.
9-14"	(B_2)	Dark brown (7.5YR 3/2), brown (7.5YR 5-/2) dry, fine sandy loam; weak moderate subangular blocky structure; slightly hard when dry, friable when moist, very slightly sticky when wet; some iron and organic staining with many distinct mottles in the lower contact zone; many roots with some concentration at the zone near the contact with the underlying indurated horizon;

Series A (continued)

Depth	Horizon	Description
		noneffervescent; lower boundary is abrupt and wavy.
14-24"	(B_{x1})	Dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2), grayish brown (10YR 5/2) dry; heavy loamy fine sand; highly indurated horizoned with much cementation with iron and silica; virtually no percolation of water through the horizon; rather wide range in the degree of induration or cementation between pedons; noneffervescent; lower boundary is clear and wavy.
24"	(C)	Dark grayish brown (10YR4/2), light brownish gray (10YR 6/2) dry; loamy fine sand; single grain-structureless condition; soft when dry, friable when moist; very few gravel and stones in some areas; noneffervescent.

Series B

0-1"	(0)	Black (10YR 2/1) to dark gray (10YR 4/1)* and dark grayish brown (10YR 4/2) dry, light sandy loam; very weak crumb structure; an organic horizon but with some mineral matter inclusion in the lower portions; some partially decomposed litter; very few roots; noneffervescent; lower boundary is abrupt and wavy.
1-4"	(A_1)	Very dark brown (10YR 2/2) and black (10YR 2/1), dark grayish brown (10YR 4/2), loamy sand; weak fine to moderate crumb structure; soft when dry, friable when moist; high content of organic matter of which a small fraction is not totally decomposed; many roots; noneffervescent; lower boundary is clear and wavy.

Series B (continued)

Depth	Horizon	Description
4-5"	(A_2)	Very dark grayish brown (10YR 3/2), grayish brown (10YR 5/2), dry, loamy fine sand; single grain - structureless; soft when dry, friable when moist; some bleaching of the iron and aluminum sesquozides from the quartz grains; incipient horizon which appears in most of the pedons; few roots; noneffervescent; lower boundary is abrupt and wavy.
5-8"	(B_{2t1})	Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2), dark grayish brown (10YR 4/2) dry, fine sandy loam; weak to moderate medium subangular blocky structure; soft when dry, friable when moist, very slightly sticky when wet; many roots; noneffervescent; lower boundary is clear and smooth.
8-20"	(B_{2t2})	Very dark grayish brown (10YR 3/2), grayish brown (10YR 5/20) to brown (10YR 5/3) dry, fine sandy loam; weak fine and medium prisms separating to a weak to moderate medium subangular blocky structure; slightly hard when dry, friable when moist, very slightly sticky when wet; many roots; noneffervescent; lower boundary is gradual and wavy.
20+"	(C)	Grayish brown (10YR 4/2) to dark grayish brown (10YR 4/2), light brownish gray (10YR 6/2) to pale brown (10YR 6/3) dry, loamy fine sand; soft when dry, friable when moist; incipient fragipans of questionable age appear in the 30 to 50" zone, these are not well defined and appear to be discontinuous across the landscape; noneffervescent.

Series C

Depth	Horizon	Description
0-4"	(A_1)	Black (10Yr 2/1) to very dark brown (10YR 2/2) to dark grayish brown (10YR 4/2) dry, loamy sand, weak fine crumb structure grading to a structureless condition; very soft when dry, friable when moist; many fine roots; noneffervescent, lower boundary is clear and smooth.
0-4"	(A	
4-10"	(C_1)	Very dark grayish brown (10Yr 3/2) to dark grayish brown (10YR 4/2) to light grayish brown (10YR 6/2) coarse loamy sand; single grain - structureless condition; very soft when dry, friable when moist; many fine and medium sized roots; some stratification of sediments is evident; noneffervescent; lower boundary is abrupt and smooth.
10-18"	(C_2)	Dark grayish brown (10YR 4/2) to light grayish brown (10YR 6/2) dry, sand; structureless condition; very soft when dry, friable when moist; many fine and medium sized roots, definite stratification of sediments noneffervescent; lower boundary is abrupt and smooth.
18-29"	(C_3)	Dark grayish brown (10YR 4/2) to pale brown (10YR 6/3) dry, loamy sand; single grain - structureless condition; very soft when dry, friable when moist, very fine and medium sized roots; definite stratification of sediments; noneffervescent; lower boundary is clear and wavy.
29-42+"	(C_4)	Grayish brown to dark grayish brown 10YR 4/2) to light brownish gray (10YR 6/2z) moist to light gray (10YR 7/2) dry, sand; single grain - structureless condition; very soft when dry, friable when moist, very few roots; stratification of sediments; noneffervescent.

Series D

Depth	Horizon	Description
0-3"	(O)	Black (10YR 2/1) to dark grayish brown (10YR 4/2) dry, organic material; very weak fine and medium crumb structure in the lower portion of the horizon; very soft when dry, friable when moist; many predominantly fine roots in lower portion; noneffervescent; lower boundary is clear and wavy.
3-4"	(A_2)	Grayish brown (10YR 4/2) grading to very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2) dry, fine loamy sand; single grain - structureless condition; very soft when dry, friable when moist; roots not as prevalent as above or below; noneffervescent; lower boundary is gradual and wavy.
4-24"	(B_2)	Very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2) dry with only small amounts of lightening with depth; heavy loamy fine sand with a couple of 2" zones which approach a coarse fine sandy loam; weak fine and medium prisms separating to a weak fine subangular blocky structure in better areas; some definite iron and organic straining with zones of very weak cementation widely spaced; many roots in upper portion; noneffervescent; lower boundary is gradual and wavy.
24-36"	(BC)	Dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) dry, loamy sand; very weak medium prismatic structure; soft when dry, friable when moist; very few distinct mottles in the lower boundary is clear and wavy.

Series D (continued)

Depth	Horizon	Description
36"+	(C_x)	Grayish brown (10YR 5/20) or light brownish gray (10YR 6/2) dry, coarse loamy sand; massive - structureless condition; series of cementation bands through the 36 to 55" zone; no root penetration; noneffervescent.

Series E

0-8"	(O_1)	Pale brown (10YR 6/3) dry to brown (10YR 5/3)* organic materials; structureless; substance dominated by slightly decomposed sphagnum mass tissue; noneffervescent; lower boundary is clear and wavy.
8-24"	(O_2)	Pale brown (10YR 6/3), gray (10YR 5/1), reddish brown (5YR 4/4) moist primarily organic materials; sturctureless; thinnly banded horizon containing largely organic matter in a wide range of states of decomposition; some inclusion of fine mineral matter strata; iron concretions or precipitates present; noneffervescent; lower boundary is clear and wavy.
24"+	(O_3)	Brown (10YR 5/2), gray (10YR 5/1), yellowish brown (2.54 5/4), light gray (2.54 6/1) moist partially decomposed organic materials; some large iron concretions; noneffervescent.

LABORATORY ANALYSIS OF SELECTED SOILS

	Horizon	Extractable Cations				pH	Moisture Constants			Mechanical			Organic Matter %
		Ca(1)	Mg(1)	K(2)	Na(1)		15atm	0.3atm	Available Water	Sand	Silt	Clay	
Series A	O_1					5.8							
	O_2	32.5	7.2	520	0.7	6.1	106.0	200.5	94.4				57.5
	A_{11}	10.0	2.4	239	0.7	4.9	55.7	70.4	14.7	76.9	14.7	8.4	47.7
	A_{12}	3.0	0.8	183	0.7	4.7	31.5	66.0	34.5	72.8	20.4	6.8	25.7
	B_{21}	0.7	0.3	58	0.8	5.1	14.9	33.8	18.8	74.4	14.4	11.2	13.1
	B_{22}	0.4	0.15	50	0.7	5.5	15.4	36.2	20.8	72.3	18.9	8.8	6.2
	C_1	0.4	0.15	24	0.4	5.7	16.9	33.0	16.0	80.0	14.7	5.3	3.6
	C_2	0.7	0.15	24	0.3	5.9	15.4	28.9	13.5	80.4	14.4	5.3	2.7
	C_3	0.4	0.46	38	0.4	5.9	9.7	30.4	20.8	8.7	8.0	5.3	0.4
Series A: Shallow fragipan variant	O_1					5.5							
	O_2	35.8	8.9	594	0.7	5.2	59.3	109.7	50.4				26.2
	A_0	15.5	3.6	437	0.7	4.7	17.2	47.9	30.7				26.2
	A_1	14.8	2.8	249	0.7	4.3	14.7	34.1	19.3	77.4	14.7	7.9	5.4
	A_2	3.8	0.8	67	0.5	4.7	10.3	24.1	13.9	79.7	12.2	8.1	11.8
	B_{21}	1.1	0.3	58	0.5	4.9	7.7	16.9	9.2	72.4	16.8	10.8	5.5
	B_{22}	0.4	0.2	24	0.5	5.3	(?)	(?)	(?)	74.7	14.0	11.3	4.5
	C	0.7	0.5	16	0.5	5.5	7.7	21.2	13.5	73.7	18.3	8.0	1.1

TABLE B-3 (continued)

	Horizon	Extractable Cations				pH	Moisture Constants			Mechanical			Organic Matter %
		Ca(1)	Mg(1)	K(2)	Na(1)		15atm	0.3atm	Available Water	Sand	Silt	Clay	
Series A:	0					5.7							
Incipient fragipan variant	A_1	10.8	1.9	128	0.6	5.8	18.4	48.2	29.8	65.8	27.4	6.8	12.6
	B_{21}	1.1	0.3	75	0.5	5.6	12.6	36.1	23.5	57.7	31.1	11.2	5.9
	B_{22}	1.1	0.2	67	0.5	5.7	13.2	26.5	13.3	63.4	28.0	8.6	5.5
	C_1	0.4	0.3	41	0.5	5.7	8.1	30.4	22.3	67.4	24.0	8.6	2.0
	C_2	0.7	0.5	50	0.5	5.7	6.3	19.7	13.4	67.4	24.0	8.6	0.5
Series B	A_1	3.0	0.5	128	0.5	5.5	25.9	82.3	56.5	70.5	20.6	8.9	13.1
	B_2	1.9	0.3	41	0.6	5.7	20.4	75.4	54.9	62.1	24.0	13.9	5.4
	C_1	0.4	0.2	8	0.5	5.6	5.8	10.3	4.5	89.4	6.0	4.6	1.4
	C_2	0.7	0.3	33	1.1	5.6	9.6	30.2	20.6	61.4	24.0	14.6	0.8
	C_3	0.4	0.5	41	0.8	4.3	3.6	13.9	10.3	67.4	24.0	8.6	1.0
Series C	A_{11}	9.3	1.4	192	0.4	5.6	13.7	27.7	14.0				6.2
	A_{12}	6.5	0.8	119	0.5	5.7	8.4	21.4	13.1	80.0	14.7	5.3	1.8
	C_1	3.8	0.2	58	0.4	6.0	5.3	8.0	2.7	92.0	4.7	3.3	0.2
	C_2	7.3	0.5	84	0.5	5.9	9.6	36.1	36.5	73.4	20.7	5.8	1.8
	C_3	5.0	0.2	75	0.4	6.0	7.5	17.8	10.3	81.4	14.7	3.8	0.5

TABLE B-3 (continued)

	Horizon	Extractable Cations				pH	Moisture Constants			Mechanical			Organic Matter %
		Ca(1)	Mg(1)	K(2)	Na(1)		15atm	0.2atm	Available Water	Sand	Silt	Clay	
Series C (continued)	C_4	7.7	0.9	110	0.5	6.0	11.3	41.5	30.2	51.4	42.7	5.8	2.1
	C_5	6.1	0.9	146	0.5	6.0	9.9	27.8	17.9	67.4	26.7	5.8	1.6
Series D	O_1					5.2							
	O_{21}	7.7	3.0	192	0.7	4.3	69.5	162.0	92.5				5.2
	O_{22}	7.7	3.6	220	0.7	4.1	84.4	204.0	119.6				65.6
	A_2	1.1	0.6	33	0.5	4.4	25.3	61.1	35.8	77.8	12.4	9.8	17.7
	B_{21}	0.4	0.2	24	0.5	5.4	25.0	56.3	31.3	67.0	18.6	14.4	19.6
	B_{22}	0.4	0.5	16	0.6	5.7	24.2	47.8	23.6	68.9	14.9	16.2	13.6
	B_{23}	0.4	0.3	24	0.5	5.8	23.4	64.8	41.4	71.2	13.7	15.1	11.8
	C_1	0.4	0.3	24	0.5	6.1	17.6	47.1	29.5	64.7	22.0	13.3	5.5
	C_2	0.4	0.5	24	0.5	6.7	15.4	34.0	18.6	76.7	12.0	11.3	3.9

TABLE B-4

SOIL SUITABILITY & LIMITATIONS FOR SELECTED USES

MAPPING UNIT	SUITABILITY FOR: SEPTIC TANKS	TRAILS & PARKS	OVERNIGHT CAMPING	PICNIC FACILITIES	PLAYGROUND
1-A	Severe limitations due to fragipan which results in perched water table, remaining soil matrix far too porous	Severe limitations due to surface water ponding during some seasons	Severe limitations due to surface water ponding during some seasons	Seasonal use only due to excessive amounts of surface water	Low fertility, high water table and lack of water holding capacity result in difficult system to manage
1-B	Severe limitations due to fragipan which results in perched water table, remaining soil matrix far too porous	Moderately severe restrictions due to surface water	Moderately sever restrictions due to surface water	Moderately severe restrictions due to surface water	Low fertility, high water table and lack of water holding capacity result in difficult system to manage
1-C	Severe limitations due to fragipan which results in perched water table, remaining soil matrix far too porous	Moderate limitations - same erosion potential	Moderately well adapted	Moderately well adapted	Too steep for most organized play activities, low fertility
2-A	Severe limitations due to fragipan, large amounts of organic materials on surface, saturated conditions through much of year	Severe limitations due to surface water ponding during some seasons, surface horizons instability	Severe limitations due to surface water ponding during some seasons, surface horizon instability	Severe use limitations due to moisture and fragility of some surface horizons	Wetness, surface horizon instability, low fertility
3-AB	Moderately severe to serve limitations due to presence of fragipan, high water table and a porous soil matrix	Severe limitations because of surface water impoundment and fragility of some surface horizons	Severe limitations because of surface water impoundment and fragility of some surface horizons	Seasonal use only due to surface water	Undulating surface would require leveling, surface water and drainage problems, low fertility for turfgrasses
4-D	Moderately well suited with some limitation due to excessive percolation	Few limitations but some erosion potential without proper construction and maintenance	Steep slopes would require excessive cuts in road and camp construction	Steep slopes would require excessive cuts in road and camp construction	Too steep for most organized play activities, low fertility and limited moisture holding capacity

TABLE B-4 (Continued)

SOIL SUITABILITY & LIMITATIONS FOR SELECTED USES

MAPPING UNIT	SUITABILITY FOR: SEPTIC TANKS	TRAILS & PARKS	OVERNIGHT CAMPING	PICNIC FACILITIES	PLAYGROUND
4-CD	Moderately well suited with some limitation due to excessive percolation	Few limitations but some erosion potential without proper construction and maintenance	Steep slopes would require excessive cuts in road and camp construction	Steep slopes would require excessive cuts in road and camp construction	Too steep for most organized play activities, low fertility and limited moisture holding capacity
5-A	Moderately severe and severe limitations due to porous soil matrix and presence of fragipan high water table during certain seasons	Moderate to severe limitations due to surface water impoundment in some locations	Moderate to severe limitations due to surface water impoundment in some locations	Seasonal use only due to excessive amounts of surface water	Surface water impoundment in some areas, low fertility, broken surface relief, restrict to seasonal use only
6-A	Moderate to moderately severe limitations, fragipan at 24" and limited capacity to assimilate waters	Moderate limitations because of some seasonal restrictions due to excess moisture	Moderate limitations because of some seasonal restrictions due to excess moisture	Seasonal use only	Minimal restrictions, low fertility and some surface undulations
7-BC	Very severe limitations, old abandoned channel which occassionally floods, fragipan present in some areas	Very severe due to flooding and subsequent erosion probability	Very severe due to flooding and subsequent erosion probability	Very severe due to flooding and subsequent erosion probability	Very severe limitations, high erosion/flood potential, slopes too steep
8-A	Very severe limitations, surface water impoundment, fragipan near surface, porous soil matrix	Severe due to surface water, fragile surface horizons in some locations	Very severe due to seasonal surface water impoundment	Very severe due to seasonal surface water impoundment	Very severe limitations, surface water ponding, fragile surface horizons, low fertility, broken surface relief
9-AB	Severe limitations due to shallow depth over fragipan and cemented gravels	Moderately severe limitations due to high surface water levels during the spring and early summer	Moderately severe limitations due to high surface water levels during the spring and early summer	Moderately severe limitations due to frequent ponding of surface waters	Wetness, low fertility, surface horizon instability

TABLE B-4 (Continued)

SOIL SUITABILITY & LIMITATIONS FOR SELECTED USES

MAPPING UNIT	SUITABILITY FOR: SEPTIC TANKS	TRAILS & PARKS	OVERNIGHT CAMPING	PICNIC FACILITIES	PLAYGROUND
10-DE	Not feasible	Not feasible	Not feasible	Not feasible	Not feasible
11-A	Moderately severe to severe, fragipan and considerable surface water ponding	Moderately severe due to surface water ponding	Moderately severe due to surface water impoundment seasonally	Moderately severe due to surface water impoundment seasonally	Seasonal surface water, low fertility and limited water holding capacity
12-AB	Not feasible	Very severe limitations, surface water impoundment, very fragile soil systems	Not feasible	Not feasible	Not feasible

B.2 Flood Plain Calculations

Figure B-1 and Table B-5 are calculations relating to a determination of the flood plain on the Recreation Site. Table B-5 represents flood peak discharges calculated for selected year events and are based on watershed characteristics combined with a methodology for evaluation of natural flow streams prepared by the USGS (1).

TABLE B-5

PEAK-FLOOD DISCHARGE
SALMON RIVER AT THE RECREATION SITE

Event Year	Flood-Peak Discharge
2 yr (Q_2)	3,238.0 cfs
5 yr (Q_5)	4,903.9
10 yr (Q_{10})	6,259.1
25 yr (Q_{25})	8,548.4
50 yr (Q_{50})	9,469.2

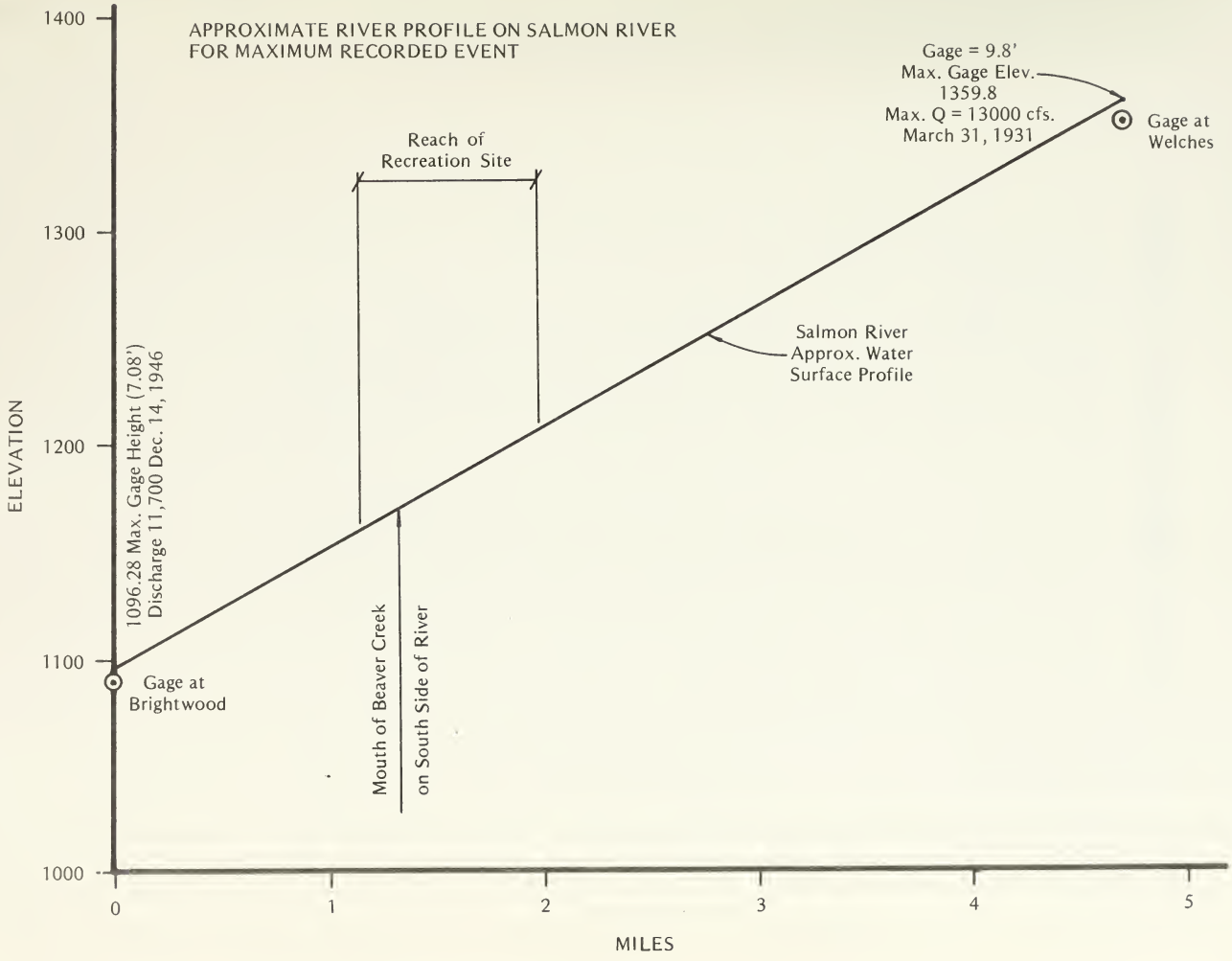
Figure B-1 represents an approximate river profile for maximum recorded events at two gaging stations on the upstream and downstream sides of the Recreation Site. The profile is only approximate since the recordings are for unequal events. No information was available for the two stations for the same flood event. The figure represents an event of approximately 11,000 to 12,000 cfs which when compared with Table B-5 would be equivalent to slightly larger than a 50 year event.

The accuracy of these figures is understandably low and does not seem to be confirmed by recent flood activity in March, 1975 at the Recreation

Site. At that time, portions of the Family Picnic Area were flooded in an event that does not appear to be of 50-year magnitude.

Figure B–1

APPROXIMATE RIVER PROFILE ON SALMON RIVER
FOR MAXIMUM RECORDED EVENT



APPENDIX C - RECREATION DEMAND ANALYSIS

C.1 Mt. Hood Community Definition

The Mt. Hood Community is defined as those communities, counties and governmental agencies having land within the Planning Unit Boundary. These are: Hood River and Clackamas Counties, the USFS, BLM, and the communities of Parkdale, Government Camp, Cherryville, Rhododendorn, Zig Zag, and Wildwood.

C.2 Recreation Demand Analysis Assumptions

1. Since the Recreation Site is located within the Planning Unit and is affected by any changes in land use directions within that area, the Planning Unit will be considered the study area for the recreational analysis. In addition, facilities which occur within five miles of the perimeter of the Planning Unit will also be included, since it is considered that in most cases people would be willing to drive five or six minutes longer if necessary to reach a spot to camp or picnic.

2. The study prepared by the Oregon State Highway Division entitled Oregon Outdoor Recreation will be used as the basis for the recreation demand projections of this project. The study is currently used as the primary reference base for an overwhelming majority of recreation demand analyses in the state and the data that supports it are much too invaluable to discard in any new analyses. In using this study, however, the following assumptions are made.

The Oregon Outdoor Recreation Demand projections were formulated in 1970 using the following formula assumptions: (4)

leisure time would increase - 5.5% annually
mobility would increase - 9.1% annually
income would increase - 2.4% annually

These were combined to get an annual increase in recreation demand of 1.3%. However, since 1970 three things have occurred which could significantly affect those assumptions.

a. The rate of inflation has increased substantially from 5.2% in 1970 to 13.9% in 1974. Although it is currently showing a slight decrease it seems safe to say that disposable income for recreational uses in the next several years may not be as high as it has been in recent years.

(The prediction of human behavior is far from exact. While a decrease in disposable income is most likely to have a corresponding effect on the dollar expenditure for recreation activities, we are currently experiencing a reverse phenomena. As the national economic picture has declined dramatically in the last two years and with it both real and disposable income, we have seen a tremendous increase in demand for recreation activity. The current trend seems generally to be in either very short term, local, low cost recreation such as theater-going, or in very expensive recreation expenditures such as yachts, power boats, or luxury trips. The feeling is that these current recreation demands will be short term and are more of a response to the idea that one had better spend it today because tomorrow is uncertain, or that the theater is an easy, relatively inexpensive way to escape for short times into fantasy.)

b. Mobility rates have been and will continue to be affected by the "energy crisis" and there is no accurate way to project its effect. It is possible that mobility will decrease instead of increase. There is also the possibility that it will significantly increase the amount of day-use oriented recreation activities and decrease over-night or longer types of use.

c. Since 1970 several studies have been done concerning the accuracy of rising TIM (time/income/mobility) factors as a method of projecting increased recreation demand. In a study done for the State Parks and Recreation Branch, it was concluded that the "TIM" factor projection method is without theoretical justification and that the variables of the TIM factors are so highly correlated as to suggest empirical weakness. (5)

The U. S. Bureau of Outdoor Recreation (BOR) is also reconsidering the validity of this projection method. In a conversation with a representative of BOR's Region X (6), it was indicated that although they agree there has been a per-capita increase in recreation since 1940 that they are questioning the ability to equate it with any particular quantifiable factor or set of factors. It is also impossible to predict whether the per-capita increase will continue in the future. Therefore, BOR is now applying a method which involves straight use/population projections with some subjective reasoning as to which activities might increase rapidly or slowly in the future.

3. In setting maximum user rates for the Recreation Site we also take into account the subjective elements of user enjoyment.

An article entitled "Recreational Carrying Capacity Reconsidered" (7) points out that too often the emphasis on carrying capacity focuses so much attention on physical site factors that other important factors contributing to a balanced system of recreational opportunities are overlooked. The author suggests that one look beyond the term "carrying capacity" and make the distinction between technical issues (what can be) and value choices (which possibilities ought to be).

Outdoor recreation is primarily a psychological experience whose quality may depend as much (or more) on a person's expectations, belief systems, and prior experiences as on the physical condition of the area he visits.

Each argument for limiting use includes - implicitly or explicitly - a judgment of what the site ought to be often in terms of traditional notions of naturalness, numbers and kinds of facilities, and types of experiences provided. Nearly every site, however, could be used in a number of ways ranging in intensity from wilderness to high-rise condominiums. Therefore, a basis for decisions is essential. (8)

Physical site characteristics as well as some subjective materials dealing with user enjoyment have been considered in synthesizing alternative suggestions for site development.

4. At the current time, the Hood Input Team is working on a computerized land allocation model for the Planning Unit. (9) The technical data assembled through this process may possibly alter currently held views about the entire ecological make-up of the land, including U. S. Highway 26 and the Recreation Site. Unfortunately, it will not be completed in time to incorporate into this study, but it should be kept in mind as decisions are made regarding the Recreation Site in the coming years.

TABLE C-1

USER STANDARDS

Activity	Standard	Comments
Hunting	1 acre per 0.0133 user	Equal to 75 acres per hunter
Boating	1 lane per 175 users	Recognize that not all boaters require launch lanes
Camping	1 site per 8 users	
Picnicking	1 site per 7 users	
Walking (urban)	1 mile per 20 users	
Hiking	1 mile per 10 users	Includes nature walks hiking
Horseback Riding	1 mile per 4 users	On recognized trail
Horseback Riding		Requires no special facility, riding along country roads, etc.
Snow Activities	1 acre per 9 users	Includes skiers & snow players who use developed facilities.
Fishing	1 mile major stream per 12 users	The boating standard serves the lake fishing people.
Outdoor Games	1 acre per 8 users	
Pleasure Driving	1 mile per 100 users	A scenic driving standard.
Golf	1 hole per 25 users	

Source: Oregon Outdoor Recreation supplements and revisions 1972

C.4 Demand Projection Process

The following example as illustrated by figure C-1 illustrates the process used to determine recreational demand.

It is determined from available data that 100 boat ramps existed in Districts 2 and 9 in 1970 and that 50 more ramps are needed in the same area by 1990. From an inventory of the study area it is determined that 75 of the existing ramps or 75% are located in the study area. Assuming the same percentage of total boat ramps projected will be needed in the same area, it could be said that the demand for new boat ramps in the study area would be 75 percent of 50 or 38 additional boat ramps giving the study area a total of 113 boat ramps needed in 1990.

In doing this it is assumed that existing facilities are located where they are because past demand has indicated that these areas are where people want to participate in various activities and they will continue to want to be there.

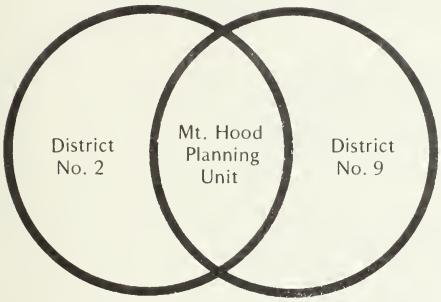
Two assumptions are implicit in this process:

1. No account is made for carrying capacity beyond those which are inherent in the user standards. The determination of whether the planning area could carry 38 more boat ramps, for example, would have to be made when land allocation and carrying capacity standards are established for the Planning Unit.

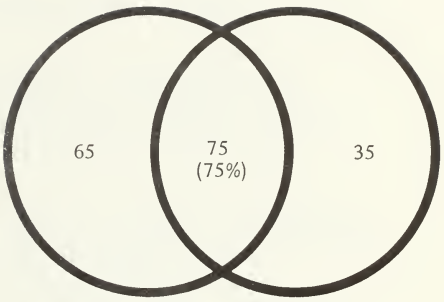
2. No new major recreation area will be developed outside the planning area (but within state administration districts 2 and 9) offering additional excellent facilities for the specified activities. (11)

Figure C–1

DEMAND PROJECTION EXAMPLE



A. DISTRICT ALLOCATION



B. EXISTING BOAT RAMPS

C. 1990 DEMAND FOR
BOAT RAMPS

C.5 Table 1 Definitions and Explanation Notes

1. Planning Unit Definition: The area contained within the Planning Unit plus camping and picnicking units located within approximately five miles of its borders in all directions.

2. Camping Site Definition: This is a developed site count only. A developed site is defined by the USFS as a site including a tent or trailer space, a fireplace or stove, parking space, and a table. Many areas of Mt. Hood National Forest are open to campers who do not meet this criteria and therefore cannot be inventoried. (12)

3. Picnic Site Definition: This is a developed site containing a table, stove or fireplace and a place to park a car, but no overnight facilities. (13)

4. Boating (launch lane) Explanatory Note: Not all boats require launch lanes for access.

5. Hiking and Horseback Riding Trails Explanatory Note: Several of the same trails serve riders and hikers.

6. Outdoor Games Explanatory Note: According to the USFS, facilities for outdoor games within the Planning Unit are limited to those provided at the Recreation Site.

C.6 Recreation Site Picnic Facilities

Picnicking is the primary activity use of the Recreation Site. Facilities are provided for both family and group picnics. In the Family Picnic Area 101 tables are scattered in 62 units. Half of the units contain one table and a charcoal grill. The other half contain a grill and two or three tables so that more than one family can enjoy a picnic together.

The Group Activity Area is designed to accommodate large group and organizational picnics. Play areas, baseball diamonds, volleyball courts and horseshoe pits are provided. Three types of accommodations are provided. For the largest groups there are two shelters. Each provides picnic tables, hot plates, grills and sinks as well as the large open fireplaces. Two picnic kitchens, each designed to accommodate one to four groups are located outside the shelter area. Each also provides hot plates, grills and a sink. Six smaller units of 3 tables each provide tables, grills and fire rings for small groups.

C.7 The Recreation Site Accommodation Levels

About 900 people can be accommodated on the Recreation Site at one time. This is calculated at the Oregon Outdoor Recreation User Standard Rate of 5 people per table. (14)

Family Picnic Area

101 tables at 5 people per table = 505 people

Group Activity Area

Shelter #1:
24 tables at 5 people per table = 120 people

Shelter #2:
24 tables at 5 people per table = 120 people

Picnic Circle #1:
8 tables at 5 people per table = 40 people

Picnic Circle #2:
8 tables at 5 people per table = 40 people

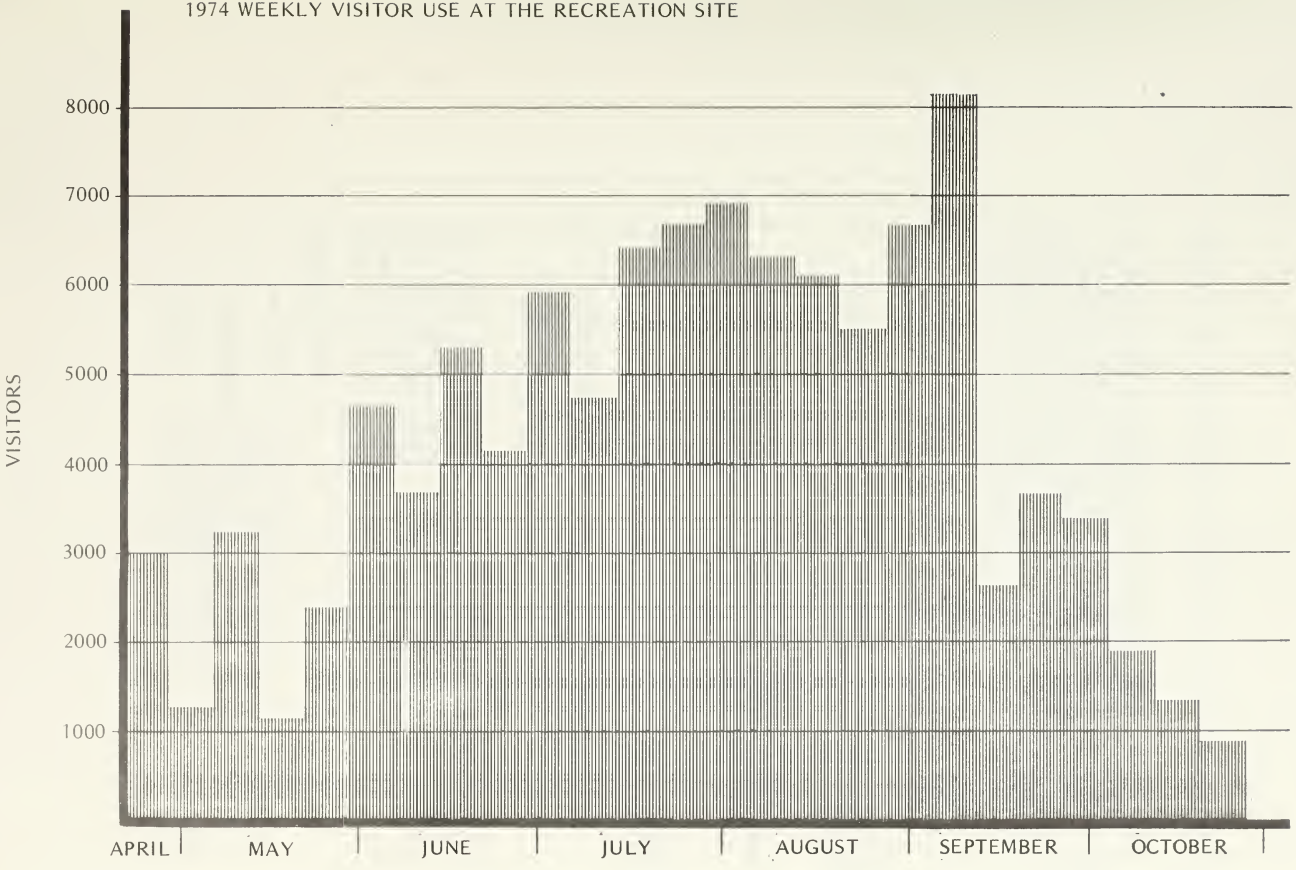
6 areas of 3 tables each:
18 tables at 5 people per table = 90 people

C.8 Weekly Visitor Use at the Recreation Site, 1974

Figure C-2 is compiled from weekly car counts taken at the Recreation Site. The count was read each Monday morning with the exception of 3-day holiday weekends when the count was taken on Tuesday morning to include the entire weekend. The count was taken on a per car basis and then multiplied by a factor of four people per car.

Figure C–2

1974 WEEKLY VISITOR USE AT THE RECREATION SITE



C.9 Effects of Alternative Futures on the Recreation Site

The matrices presented in figures C-3, 4, 5 and 6 illustrate the effects on the future of the Recreation Site of each of the Alternative Futures being discussed by the Hood Input Team. The matrices will interpret the effect of each element of each futures alternative on the five major variables defined below:

1. Visitor Use - will the element have any impact on the number of people visiting the site?

2. Group Use - will the element have any impact on the number of groups using the facilities at the site?

3. Use Intensity Pressure - will there be increased pressure to develop additional land on the site or to go to a higher intensity of use per acre?

4. Activity Demand - will changes in the element cause a demand for any specific activities?

5. Potential Effect on Site Quality - will changes in the element cause a change in the quality of recreation experience available at the site?

In order to express changes in the first 3 matrix variables an impact rating of high, moderate or low is established. It is individually defined for each category. In all cases, unless otherwise stated, impact will indicate an increase of some type of pressure on the site.

Visitor Use

- High - a significant increase in the number of visitors to the site.
- Moderate - some increase in the number of visitors to the site.
- Low - little to no increase in the number of visitors to the site.

Use by Groups

- High - a significant increase in the number of groups using the group facilities at the site.
- Moderate - some increase in the number of groups using the group facilities at the site.
- Low - little to no increase in the number of groups using the group facilities at the site.

Use Intensity Pressure

- High - significant pressure to use more of the land available at the site as well as higher intensity of use per developed acre.
- Moderate - some pressure to use more of the land available at the site and/or a higher intensity of use per developed acre.
- Low - little or no pressure to either use more of the land available at the site or to establish a higher intensity of use per developed acre.

Activity demand is not a question of impact, but an assessment of what type of activity demand any particular element in the future might generate.

Activity Demand

- MP - a demand for more family picnic sites.
- MG - a demand for more group picnic and activity sites.
- T - a demand to develop trail heads for access to the Planning Unit trails.
- C - a demand to develop camping facilities.
- NC - no additional facility demand.

Potential Effect on Site Quality

Site quality is the most subjective of all the variables. It is currently agreed upon by most recreational planners that one of the factors relating to the quality of a recreational experience is the intensity of use on any give site. (7)

In addition, all specific visitor information available for the Recreation Site indicated that a prime psychological enjoyment and quality factor for site users is tied to the specific "non-intensive" feeling of its current development.

Therefore, in this matrix category, a rating of NC (no change) indicates that there is no reason to believe that the specific element of the future would create pressure that would change the present psychological quality of the site experience. An "I" (increase) indicates possible beneficial effects on the experience and a "D" (decrease) indicates potential negative effects.

Figure C-3
Alternative 1 - Effect on Recreation Site

FUTURES / ELEMENTS	Future 1	Effect on Wildwood Recreation Site					
		Visitor Use	Use by Groups	Use Intensity Pressure	Activity Demand	Potential Effect on Site Quality	Remarks
AGRICULTURE & FOREST	Continued shift to other uses;timber management level varies.	Low	Low	Low	NC	NC	
HOUSING	Controlled by permitted services; upper level of development undefined	Moderate	Low	Moderate	MP	D	Possible increase in local rise as housing units grow
COMMERCIAL & INDUSTRIAL	Increase in numbers and size; some additional strip development.	Low	Low	Low	NC	NC	
RECREATION & WILDERNESS	Expand ski, golf facilities project by project; some adjustment of present Mt. Hood wilderness boundary.	Moderate	Moderate	Moderate	T	NC	Possible increase in use of trials throughout area.
WILDLIFE & FISHERIES	Uncontrolled dog harassment, gradual decline in native habitat; greater dependence on trout stocking	Low	Low	Low	NC	D	Possible decline in use if harassment is truly great and site quality deteriorates
MINERALS ENERGY & POWER	Geothermal siting and rock quarries case by case; permit new power corridors as needed.	Low	Low	Low	NC	NC	
TRANSPORTATION	Expand Highway 26 to full four lanes. Increased parking at developed recreation sites.	High	High	High	MP MG	D	Could put pressure on to over develop site.
SEWER WATER & SOLID WASTE	Upgrading of existing systems required; new systems or expansion of present systems case by case.	Low	Low	Low	NC	I	Might make disposal changes mandatory at Wildwood.
FIRE & SCHOOLS	Expand local police, fire and school facilities as needed; fight all forest fires aggressively.	Low	Low	Low	NC	NC	
TAXATION & PUBLIC COSTS	Unpredictable increase in local taxes and public expenditures over long term; gradual reduction in timber revenues.	Low	Low	Low	NC	NC	
ADMINISTRATION	No change in jurisdictional authority, disband interagency planning.	Low	Low	Low	NC	NC	

Figure C-4
Alternative 2 - Effect on Recreation Site

FUTURES / ELEMENTS	Future 2	Effect on Wildwood Recreation Site					
		Visitor Use	Use by Groups	Use Intensity Pressure	Activity Demand	Potential Effect on Site Quality	Remarks
AGRICULTURE & FOREST	Maintain present agriculture lands; timber management level is high, but less land available	Low	Low	Low	NC	NC	
HOUSING	Mixed pattern; some clustered growth.	Moderate	Moderate	Moderate	MP	NC	Depending on location of housing the effect on site will vary.
COMMERCIAL & INDUSTRIAL	Expand within present centers; no additional strip development.	Low	Low	Low	NC	NC	
RECREATION & WILDERNESS	Limit ski to present permit areas, some new overnight accommodations, additional new wilderness.	Moderate	Moderate	Moderate	MP T	NC	
WILDLIFE & FISHERIES	Moderate harassment level, some native habitat loss, some expanded fisheries	Low	Low	Low	NC	NC	
MINERALS ENERGY & POWER	Maintain present quarries and power corridors; present type geothermal incompatible.	Low	Low	Low	NC	NC	
TRANSPORATION	Highway 26 with some three- and four-lane parkway segments and controlled access; emphasize mass transit during peak use.	High	High	High	MG MP	D	Could put pressure on site for expansion.
SEWER WATER & SOLID WASTE	Improve existing sewer and water service, some expansion within firm boundaries.	Moderate	Moderate	Moderate	MG MP	I	Might improve disposal but also encourage expansion.
FIRE POLICE & SCHOOLS	Additional local fire protection facilities in high use areas; allow some forest fires to play natural role; new school facilities on westside; increased county and state police protection.	Low	Low	Low	NC	NC	
TAXATION & PUBLIC COSTS	Some increases in public expenditures and higher taxes; moderate increase in timber revenues.	Low	Low	Low	NC	NC	
ADMINISTRATION	Some new local service authority on private lands; continue interagency coordination; explore bi-county monitoring commission.	Moderate	Moderate	Moderate	MP MG T	D	Possible pressure by other agencies to develop.

Figure C-5
Alternative 3 - Effect on Recreation Site

FUTURES / ELEMENTS	Future 3	Effect on Wildwood Recreation Site					
		Visitor Use	Use by Groups	Use Intensity Pressure	Activity Demand	Potential Effect on Site Quality	Remarks
AGRICULTURE & FOREST	Expand agriculture to all suitable lands; high level timber management.	Low	Low	Low	NC	NC	
HOUSING	Maintain rural character; minimal development expansion.	Low	Low	Low	NC	NC	
COMMERCIAL & INDUSTRIAL	Limited expansion of present centers; revert some existing strip development to forest.	Low	Low	Low	NC	NC	
RECREATION & WILDERNESS	No expansion of ski or golf; some additional new wilderness.	Low	Low	Low	T	NC	Possible increased need for access to trails in planning unit.
WILDLIFE & FISHERIES	General habitat maintenance, with altered species mix; expanded fisheries.	Low	Low	Low	NC	I	Possible increase in flora and fauna species on site.
MINERALS ENERGY & POWER	Permit geothermal sites, existing rock quarries and power corridors. All highly regulated.	Low	Low	Low	NC	NC	
TRANSPORATION	Highway 26 is improved two-lane expressway; emphasize all-season mass transit.	Moderate	Moderate	Moderate	MG	D	Increase in mass transit could put heavy demands on group use.
SEWER WATER & SOLID WASTE	Predominantly septic tanks on suitable land; improve existing sewer and water systems, but no expansion.	Low	Low	Low	NC	I	Might make disposal changes mandatory at Wildwood.
FIRE POLICE & SCHOOLS	Upgrade local fire protection services and expand forest fire fighting capabilities considerably; maintain present level of police protection; some additional school capacity on westside.	Low	Low	Low	NC	NC	
TAXATION & PUBLIC COSTS	Lowest public expenditure level and local tax increase. Increasing timber receipts and revenues.	Low	Low	Low	NC	NC	
ADMINISTRATION	Continue present jurisdictional authorities, and interagency coordinator; explore bi-county monitoring commission.	Low	Low	Low	NC	NC	

Figure C-6
Alternative 4 - Effect on Recreation Site

FUTURES / ELEMENTS	Future 4	Effect on Wildwood Recreation Site					
		Visitor Use	Use by Groups	Use Intensity Pressure	Activity Demand	Potential Effect on Site Quality	Remarks
AGRICULTURE & FOREST	Maintain orchard lands; timber management is lower priority	Low	Low	Low	NC	NC	
HOUSING	Expand community clusters, but maintain separation.	High	Moderate	High	MP	D	Would put Wildwood in a possible situation where it is surrounded by summer housing.
COMMERCIAL & INDUSTRIAL	Some new, concentrated centers at specified sites.	Low	Low	Low	NC	NC	
RECREATION & WILDERNESS	Expand golf, ski, summer use areas, and resort accommodations; all potential wilderness.	High	High	High	MP MG T	D	Would extremely intensify recreation use in the area.
WILDLIFE & FISHERIES	High harassment levels; establish game refuge; maintain trout stocking	Low	Low	Low	NC	D	Increased harassment could lead to decreased use of site.
MINERALS ENERGY & POWER	Additional rock quarries and local power corridors, but highly regulated; present type geothermal incompatible	Low	Low	Low	NC	NC	
TRANSPORTATION	Four lanes on Highway 26; mass transit (Laurel Hill to ski areas) and some increased parking.	High	High	High	MP MG	D	Would significantly increase day visitor and traffic in the area.
SEWER WATER & SOLID WASTE	Urban-level sewerage and water system required, but contained service areas; new solid waste transfer station.	High	High	High	MP	I	Could intensity use pressure by local governments.
FIRE POLICE & SCHOOLS	New fire stations and schools required; significantly expand police protection; fight all forest fires aggressively.	Low	Low	Low	NC	NC	
TAXATION & PUBLIC COSTS	Highest public tax receipts, but greatest public expenditure level; loss of timber revenues.	Low	Low	Low	NC	NC	
ADMINISTRATION	Some local incorporation, continue inter-agency coordination. Explore bi-county monitoring commission.	High	High	High	C MP MG T	D	Could possibly intensify development pressure at Wildwood by other agencies and local governments.

APPENDIX D - SUMMARY OF CONCLUSIONS AND FEASIBILITY

D.1 Additional Soils Analytical Data

Table D-1 Laboratory Analysis of Selected Test Sites in Potential Sub-Surface Sewage Disposal Area I

Test Site		Moisture Constants			Mechanical		
		15atm	0.3atm	Available Water	Sand	Silt	Clay
I	A				65.1	24.1	10.8
	B				71.6	20.2	8.2
II	A				64.9	22.9	12.2
	B				67.0	25.2	7.8
III	A	25.8	40.7	14.9	69.0	19.8	11.2
	B	17.9	25.1	10.2	73.4	18.7	7.8
IV	A	20.9	31.4	10.5	67.4	24.7	7.8
	B	18.1	43.4	25.3	69.4	24.7	5.8

A = Sample taken at 12"

B = Sample taken at 18"

REFERENCES

REFERENCES

Sub-Surface Conditions

1. Patterson, P. V., Geologic Map, Mt. Hood Planning Unit, Mt. Hood National Forest, U. S. Forest Service, 1974.

2. Sheets, M. Meridith, Contributions to the Geology of the Cascade Mountains in the Vicinity of Mt. Hood, University of Oregon Master's Thesis, 1932, (Unpublished), p.141.

3. Barnes, F. F. and Butler W., The Structure and Stratigraphy of the Columbia River Gorge and Cascade Mountains in the Vicinity of Mt. Hood, M.A. Thesis, University of Oregon, Eugene, Oregon, 1930, (Unpublished), p.73.

4. Wise, William S., Geology and Petrology of the Mt. Hood Area, A Study of the High Cascade Volcanism, Geology Society American Bulletin, Volume 80, Number 6, 1969, p. 696-1006.

5. Lassen, L., Lull, H. W., and Frank, B., Some Fundamental Plant-Soil-Water Relations in Watershed Management, U. S. Forest Service, July, 1951.

6. McNaughton, K. G., and Black, T. A., A Study of Evapo-transpiration from a Douglas fir Forest Using the Energy Balance Approach, Water Resources Research, Volume 9, Number 6, December, 1973.

7. Rotchacer, J., "Increases in Water Yield Following Clearcut Logging in the Pacific Northwest," Water Resources Research, Vol. 6, No. 2, April, 1970.

8. Johnsgard, G. A., Temperature and the Water Balance of Oregon Weather Stations, Agriculture Experiment Station, Corvallis, Oregon, Special Report 150, May, 1963.

9. Department of Environmental Quality, Rules Pertaining to Standards for Sub-surface Sewage

and Nonwater-carried Waste Disposal, p. 106, April, 1974.

Recreation Demand Analysis

1. "Mt. Hood Planning Futures", Hood Input Planing Team, March, 1975.

2. Ibid.

3. Oregon Outdoor Recreation, revision and supplements, 1972, Oregon State Highway Division.

4. Ibid.

5. "An Empirical Analysis of Factors Affecting the Numbers of Visits to Oregon State Parks", Farid Nawas.

6. Phone conversation, April 15, 1975, Ron Hyra, Region X, Bureau of Outdoor Recreation.

7. Wager, J. Alan, "Recreation Carrying Capacity Reconsidered", Journal of Forestry, May, 1974, pp. 274-278.

8. Ibid.

9. "A Land Allocation Model for the Mt. Hood Planning Unit", Hood Input Planning Team paper.

10. Oregon State Highway Division, op. cit.

11. After talking to officials at the U. S. Forest Service, Mt. Hood Office, State of Oregon Park Officials and the involved counties, these appear to be reasonable assumptions at the present time.

12. National Forest Camp Ground Directory, U. S. Forest Service, page 2.

13. Ibid.

14. Memo to Henry O. Blessing from Larry D. Gano, Subject: Capacity Limits - Wildwood, Bureau of Land Management District Office Files, 1974.

15. Wildwood, explanatory pamphlet, BLM, 1971.

Summary of Conclusions and Feasibility

1. Goldstein, Steven H., and Moberg, Walter J., Jr., Wastewater Treatment Systems for Rural Communities, Commission on Rural Water, Washington, D. C., 1973.

Appendices

1. Lystrom, David J., Evaluation of the Streamflow Data Program in Oregon, Open File Report, U. S. Department of the Interior, Geological Survey, 1970.